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GCSE Geography

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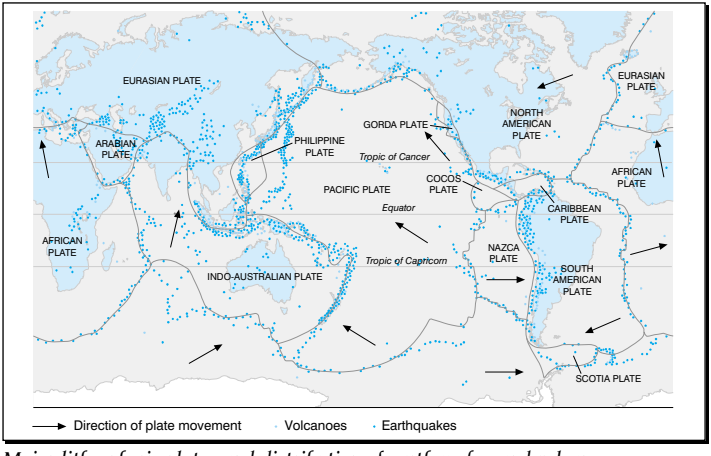
Earthquakes

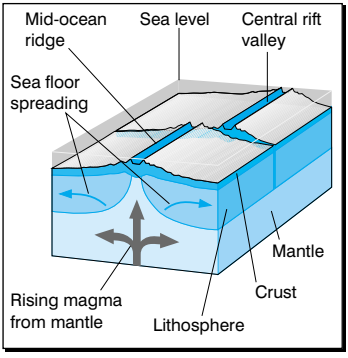
- Both earthquakes and volcanoes can be explained by the theory of **plate tectonics**. The earth's crust consists of a series of plates. There are seven main plates and many smaller ones. Some plates consist of **continental crust** others are made of largely **oceanic crust**.
- **Convectional activity** causes the plates to move. The edges of plates are called **plate margins**. There are three types of plate margins. At a **destructive** boundary the plates move together, but at a **constructive** boundary the plates move apart. At a **conservative** boundary the plates move side by side.



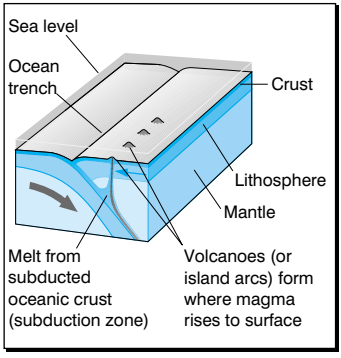
Major lithospheric plates and distribution of earthquakes and volcanoes

- At a constructive boundary molten rock or **magma** rises to the surface forming new crust. This forces the existing crust apart causing **sea floor spreading**. This causes **continental drift**. At destructive margins one plate is forced under another into the **subduction zone**.

EARTHQUAKES AND VOLCANOES (2)



Constructive plate margin (mid-ocean ridge)



Destructive plate margin (subduction zone)

- **Seismic** waves, as a result of plate movement, cause **earthquakes**. The **focus** of an earthquake is a **fault** deep in the earth's crust. The shock waves move out from the focus and reach the earth's surface at the **epicentre**. Most earthquakes occur along plate margins.
- The effect of an earthquake can be measured on the **Richter** or **Mercalli** scales. The Richter scale measures the strength on a scale of 1–10. An earthquake measuring 7 on the Richter scale is 100 times stronger than one measuring 5. The Mercalli scale measures the physical effects of an earthquake on a scale of 1–12.
- LEDCs suffer the greatest loss of life from earthquakes. This is because buildings are not as strong and emergency services are not as efficient. The economic cost of earthquakes can be greater in MEDCs as the economic life of a MEDC suffers greater disruption.
- There have been many attempts to reduce the effects of earthquakes. More accurate forecasting of earthquakes allows earlier evacuation. Use of cross bracing and installing rubber shock absorbers in foundations make buildings more resistant to shock.

Volcanoes

- **Volcanoes** occur where there is a weakness in the earth's crust. This allows magma to move to the surface where it forms **lava**. An **active** volcano is one that has erupted in living memory. A **dormant** volcano is one that last erupted in historical times. It can never be assumed that a volcano is **extinct**.
- Mount Pinatubo in the Phillipines erupted violently in 1991 having been dormant for 600 years.
- Magma can also bubble up to the earth's surface through **fissures** or cracks, which eventually forms **lava plateaux**.

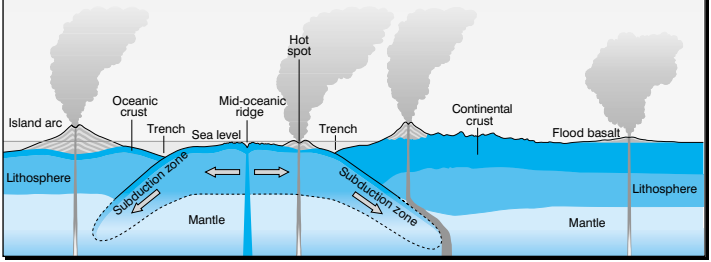
Island arcs (e.g. Aleutian Islands) Where two oceanic plates converge (e.g. western Pacific). One plate is pushed downwards (subducted) into the mantle. As the subducted plate melts, magma rises to the surface forming numerous volcanoes or island arcs.

Mid-oceanic ridges (e.g. Iceland) Tension in the crust leads to deep rifts. Magma rises up to the ocean floor along these rifts, forming new crust. The ridges form a continuous line of submarine volcanoes. In places the volcanoes rise above sea level.

Hot spot volcanoes Rising plumes of magma reach the surface in the centres of plates, e.g. Hawaii.

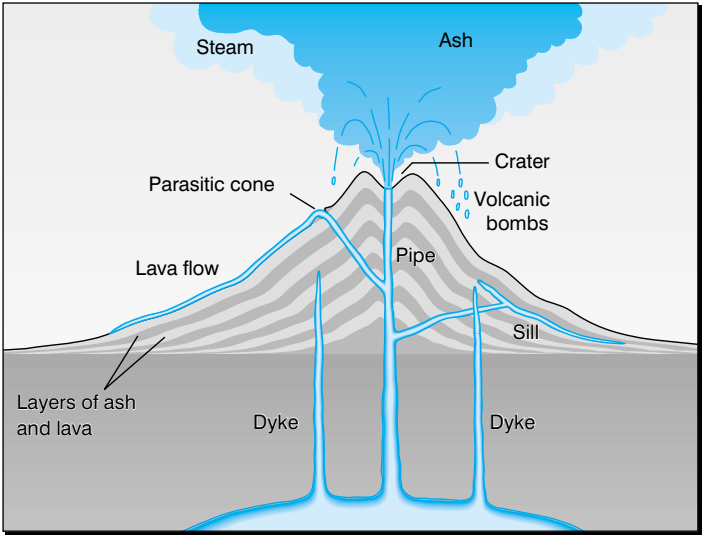
Continental-oceanic plate margins. Here the oceanic plate is subducted beneath the thicker continental plate. As it melts some of the lighter oceanic plate magma forces its way to the surface, forming volcanoes, e.g. Andean volcanoes.

Flood basalts Magma reaches surface through great cracks or fissures in crust (caused by tension) allowing vast amounts of magma to reach the surface. These eruptions build-up great thicknesses of lava, known as flood basalts.



EARTHQUAKES AND VOLCANOES (4)

- The build up of material from a series of eruptions forms a volcanic cone. The shape of the cone depends on the type of material and the chemical composition of the lava. Viscous lava forms a steep sided cone. Thin, **non-viscous** lava produces a low-angle, **shield** volcano. Many cones are **composite** as they consist of layers of ash and lava.



- Other volcanic hazards include **nueés ardents,** which are superheated clouds of gas and dust, **lahars**, which are mudflows, as well as ash, **pumice** and **toxic gas**.
- Despite the danger people still live close to volcanoes. Volcanic soils are very fertile. Tourists like to see **volcanic hot springs**, **geysers** and **boiling mud**. **Geothermal energy** produces electricity. **Precious stones** and **minerals** are often found in extinct volcanoes.

Earthquakes and volcanoes (1–4)

1 What causes the plates on the earth's surface to move? (1)

2 Which way do plates move at a constructive plate margin? (1)

3 At what kind of boundary is a subduction zone found? (1)

4 What point on the earth's surface is likely to suffer the greatest damage from an earthquake? (1)

5 How many times more powerful is an earthquake measuring 6 on the Richter scale compared to one that measures 4? (1)

6 What part of a volcanic cone does the lava come out from? (1)

7 Name an example of a shield volcano. (1)

8 What are nueés ardents? (1)

9 Why do 20% of Sicilians live on the side of the active volcano Mount Etna? (1)

10 Name an area which uses geothermal power as a source of energy. (1)

11 Why is there a series of volcanic islands down the centre of the Atlantic Ocean? (3)

12 Why are LEDCs likely to suffer a greater loss of life than MEDCs if an earthquake hits? (2)

13 What is the difference between lava and magma? (2)

14 Explain why there is a 'Pacific Ring of Fire'. (3)

SCORE

1 Convectional activity. (1) This is caused by magma moving through the mantle.
2 Apart. (1) As the plates move apart magma can reach the earth's surface, cool and form new land.
3 Destructive plate margin. (1) This is where one plate is being destroyed as it is forced beneath a neighbouring plate.
4 Epicentre. (1) This is the closest point on the earth's surface to the seismic focus of the earthquake.
5 100. (1) Remember that a rise of one point on the Richter Scale means the earthquake is ten times more powerful.
6 Crater. (1) Remember technical terms.

7 Mouna Loa, Hawaii. (1)

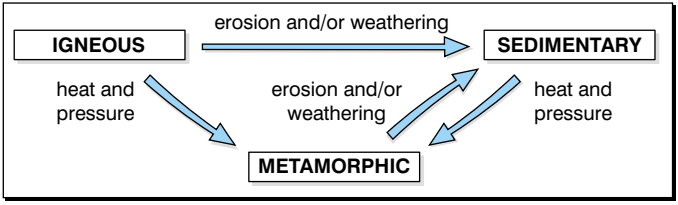
8 Superheated clouds of gas and dust. (1)

9 The soils there are very fertile. (1) Lava breaks down very readily into a workable soil. The soil is very rich in minerals.
10 Iceland. (1)
11 Sea floor spreading. (1) The Eurasian and the North American plates are moving apart. (1) This allows magma to reach the surface. (1) This question refers to a specific place so you need to state the names of the plates.
12 Buildings in LEDCs are less earthquake proof and so collapse more easily. (1) Emergency aid systems are not as efficient. (1) In a MEDC the value of the damage to the infrastructure will be much higher than in a LEDC.
13 Magma is molten rock beneath the earth's surface. (1) Lava is solidified magma on the earth's surface. (1) Magma can solidify before it reaches the earth's surface to form dykes and sills. These can be found in a composite volcano.
14 There are volcanoes dotted all around the Pacific Ocean. (1) The Pacific plate is being subducted beneath the neighbouring plates. (1) Magma is forced to the surface to form volcanoes. (1)

TOTAL

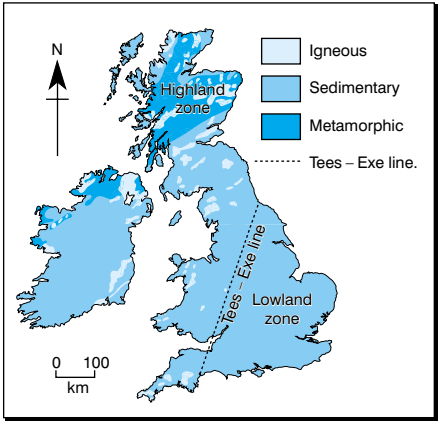
Types of rocks

- Rocks can be divided into three main groups: **igneous**, **sedimentary** and **metamorphic**. Igneous rocks are formed as molten **magma** deep in the earth's crust. They cool slowly and solidify underground. They are very resistant to erosion. Most sedimentary rocks consist of mineral particles formed by the breakdown of older rocks. Limestone, chalk and coal are sedimentary rocks formed from the fossilised remains of animals and plants. Metamorphic rocks have been changed as the result of heat, pressure or chemical reactions.



Relationship between rock types

- Rocks can be changed from one group to another by heat, pressure, erosion or weathering.
- **Granite** and **basalt** are examples of igneous rocks. **Chalk**, **limestone** and **clay** are sedimentary rocks. **Marble** and **slate** are metamorphic rocks.



Distribution of major rock groups in the British Isles

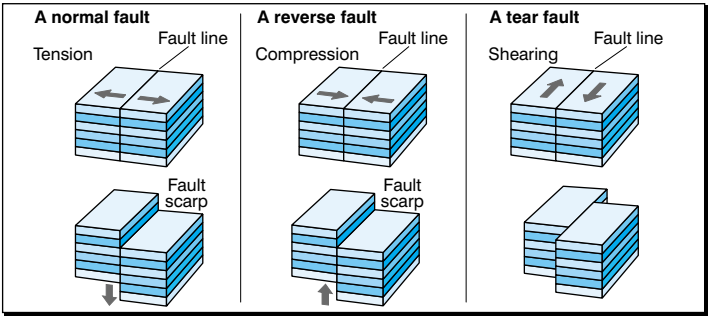
- Igneous and metamorphic rocks are found largely in the north and west of the British Isles to the north and west of the Tees–Exe line. Most of the south and east of the Isles is made up of sedimentary rocks.

Weathering

- **Erosion** and **weathering** both result in the breakdown of rocks. Erosion involves movement whereas weathering takes place 'in situ'. The material that has been broken down by weathering and erosion is removed by **mass movement**. This reveals a fresh rock face to attack from the elements. Weathered and eroded material will form **scree** at the bottom of a slope.
- There are two main types of weathering: **physical** and **chemical**. In high mountains and high latitudes most physical weathering is by **freeze–thaw**. When the temperature drops below 0°C water freezes inside cracks in the rocks. The ice can split the rocks. In deserts the large daily range in temperature produces **insolation weathering** of rocks. Minerals in the rocks expand and contract at different rates setting up internal stresses. The outer rock layers flake off; so-called **exfoliation** or 'onion peeling'.
- **Scree** is the accumulation of small rock fragments at the bottom of a slope. On flatter surfaces, especially where rock joints are widely spaced, freeze–thaw breaks up the rocks into massive boulders to form boulder fields.
- Chemical weathering is most effective in hot, wet climates. The most common forms of chemical weathering are **solution weathering** where rock minerals dissolve in rainwater; **oxidation** where minerals react with oxygen; and **hydration** where minerals absorb water. **Carbonation** causes weathering in carboniferous limestone areas.

Folding and faulting

- Distinctive landscapes develop because of the underlying rock type and as a result of **folding** and **faulting**.
- Massive **tectonic** movements cause folding and faulting. Folding occurs where rocks bend as a result of pressure. This produces upfolds called **anticlines** and downfolds called **synclines**. The Rockies and the Alps are huge, **fold mountains**. Rigid or brittle rocks fault when under pressure. **Rift valleys** and **fault scarps** form as a result of **normal** and **reverse faulting**.

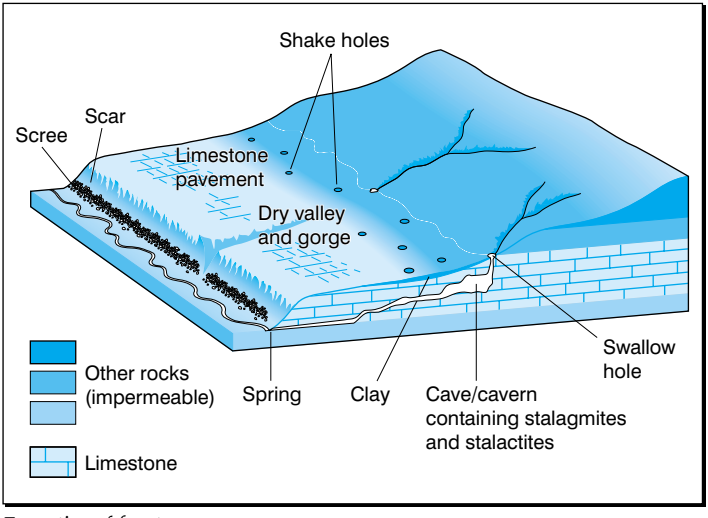


Types of fault

Landforms

- Igneous rocks develop underground as a result of **interior** or **intrusive** vulcanicity. Magma solidifies to form distinctive shapes known as **batholiths**, **dykes** and **sills**.
- Dartmoor is an example of a batholith. The **granite** upland is part of a much larger batholith beneath the earth's surface. Granite forms rugged uplands, which are poorly drained with large expanses of **moorland**. Dominant features are **tors**.
- Dykes run across rock strata whereas sills run parallel to them. Sills often form steep valleys.

- Limestone and chalk are both calcium carbonate. Limestone is **permeable** but chalk is **porous**. Acidic rainwater chemically weathers calcium carbonate by carbonation. **Karst scenery** develops on **carboniferous limestone** in areas such as the Mendips.
- The main features of karst scenery are **limestone pavements**, **swallow holes** or **sinks**, **caves**, **stalactites** and **stalagmites**. There is a lack of surface drainage because of the large number of underground streams and rivers. **Escarpments** with a steep scarp slope and a gentle dip slope are characteristic of chalk scenery. There is a lack of surface water with a complex system of dry valleys.



Formation of karst scenery

- Clay is found over extensive areas of lowlands and produces soils that are sticky and heavy when wet. Clay is impermeable, so there are many surface rivers.

Rocks and landforms(1–4)

1 Which of the following is the odd one out:
Chalk, clay, granite, sandstone, coal , mudstone, shale? (1)

2 What is oxidation? (1)

3 Why is chemical weathering uncommon in deserts? (1)

4 How can granite appear on the earth's surface even though it is formed underground from the solidification of magma? (1)

5 Name an example of an area of chalk scenery. (1)

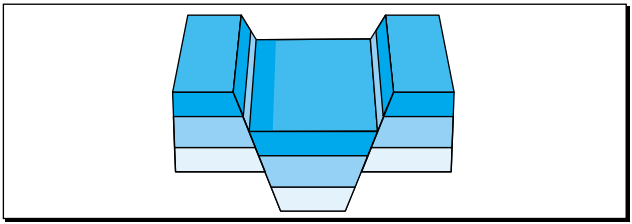
6 Why does karst scenery develop on carboniferous limestone and not on chalk when they are both calcium carbonate? (1)

7 Why are villages common at the base of a chalk scarp slope? (1)

8 What caused the valleys in chalk to become dry? (1)

9 Why is the top of an anticline more likely to erode than the bottom of a syncline? (1)

10 What landform does the following diagram show? (1)



11 What is the difference between a porous and a permeable rock? (2)

12 How can the features of granite scenery be explained in terms of the rock's hardness, its impermeability and its many joints? (3)

13 Explain how karst scenery develops. (3)

14 How can the human use of granite and limestone areas threaten the beauty of the landscape? (2)

SCORE

1 Granite. (1) It is the only igneous rock.
2 The chemical reaction between minerals in rocks and oxygen. (1) Remember it is the minerals that are oxidised.
3 Because of the lack of moisture. (1) Water is required for chemical weathering to take place.
4 Less resistant rocks on top of the granite are eroded. (1) Remember the difference between lava and magma.

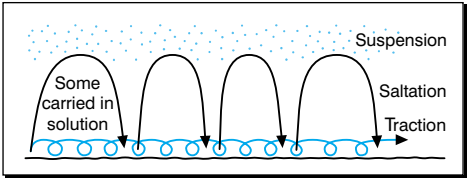
5 The South Downs. (1)
6 Carboniferous limestone has a well developed system of joints and bedding planes. (1) The acid solution formed between rainwater and limestone widens these gaps.
7 Springs form there. (1)

8 The increase in temperatures at the end of the Ice Age. (1) During the Ice Age the chalk was impermeable because ice blocked its pores.
9 The rock is stretched and therefore weaker. (1) The Weald formed this way.
10 Rift valley. (1) There is one in East Africa.
11 Permeable rock allows water to move through its joints and bedding planes. (1) Porous rock acts like a sponge retaining water in its pores. (1) Try to use the correct technical terms.
12 The rocks are hard and not easily eroded. Granite uplands therefore rise up above the surrounding countryside. (1) The rock is impermeable so surface water forms marsh and bog. (1) Chemical weathering along the joints produces tors. (1) Refer to all three features in your answer.
13 Rainwater and limestone form a weak solution of carbonic acid. This moves underground through joints and bedding planes. (1) The limestone reacts with the acid water to form calcium bicarbonate which is soluble in water. This leads to the formation of caves. (1) Evaporation leaves calcium carbonate deposits, i.e. stalactites and stalagmites. (1)
14 Quarrying for building stone is common in granite and limestone areas. (1) Both areas attract tourists who may erode footpaths, cause traffic congestion and drop litter. (1)

TOTAL

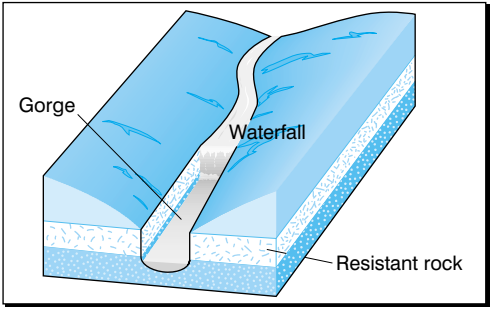
RIVERS (1)

- Water constantly cycles between the atmosphere and the earth's surface, through a series of **flows** and **stores**. The main flows are **evaporation**, **precipitation** and rivers. Examples of stores are the sea, glaciers and lakes. When precipitation reaches the ground it gets into rivers in three ways: direct flow straight from the atmosphere; surface flow; and flow through permeable rocks and the soil.
- The area drained by a river and its **tributaries** is called a **drainage basin** or **catchment**. The boundaries of the river basin or **watersheds** separate one basin from another.
- A river develops distinctive landforms as a result of **erosion**, **transportation**, and **deposition**. The processes of river erosion are **corrosion**, **corrasion**, **hydraulic action** and **attrition**. A river's load is transported by **solution**, **suspension**, **saltation** and **traction** depending on the size of material.



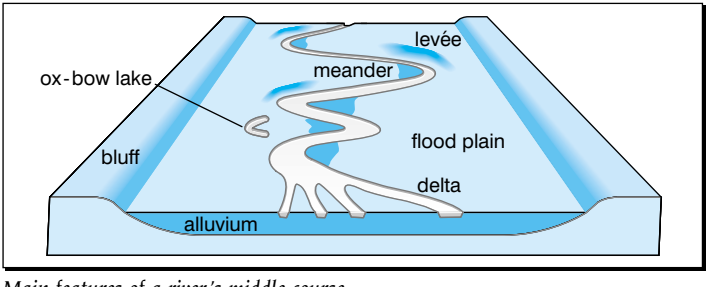
Transportation of a river's load

- A river's **long profile** or **talweg** and its cross section change from the river's source to its mouth. Moving downstream there is a decrease in the river's **gradient**, an increase in water volume and an increase in the amount of **sediment** carried by the river. These result in different processes and landforms developing in the river's **upper**, **middle** and **lower courses**.
- Landforms in the upper course form by erosion mainly. Potholing results in a V-shaped cross section. Waterfalls retreat upstream leaving a **gorge** as the result of headward erosion. The river is small and inefficient so it is easily deflected by obstacles in its path. This forms **interlocking spurs**.



Formation of a waterfall and gorge

- In the middle course the river begins to erode sideways or laterally. **Meanders** begin to form. The faster currents on the outside of river bends undercut the bank forming **river cliffs**. **Deposition** takes place on **slip-off slopes** found on the inside of meanders where the current is slower. The cross section becomes asymmetrical.

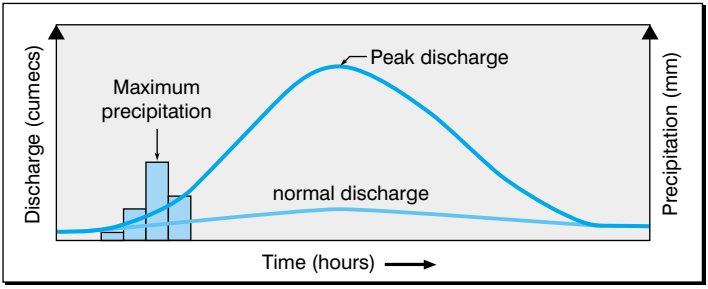


Main features of a river's middle course

- The main features of the lower course are a broad, shallow flood plain, with **ox-bow lakes** and **levées**. The river enters the sea through an **estuary** or a **delta**. Deltas occur where a river splits into a series of **distributaries**. This happens if the river flows into a sea where there are no strong tides or currents, or if the river is carrying large amounts of sediment.

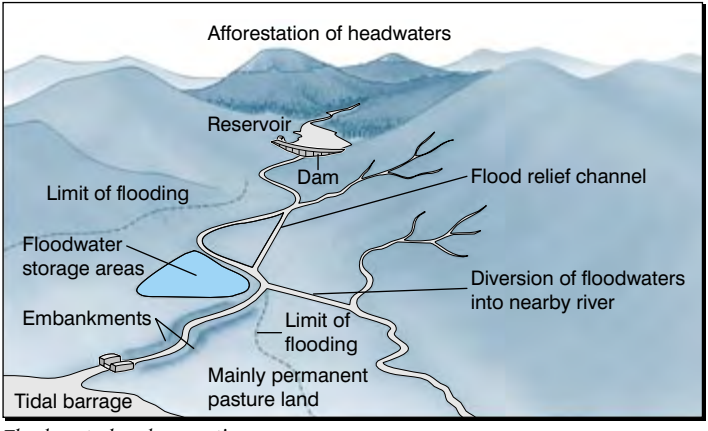
Flooding

- Rivers flood when their discharge or flow is greater than the channel can cope with. This often occurs when there is a large increase in precipitation or during a spring snow melt. The river regime shows the seasonal variations in a river's flow. The link between precipitation and **discharge** is shown in a **flood hydrograph**.



Flood hydrograph

- Flooding is more likely when precipitation is heavy and intense. If the soil is saturated water will run off quickly into rivers. Flooding is less likely if the main rock types are porous or permeable.
- Human actions can increase flood danger. Flood plains have dense populations because the fertile alluvial soils are good for farming and the river can be used for irrigation. The flat land encourages industry and settlement. The building of roads and houses increases **surface run-off**. Deforestation also increases surface run-off.
- The impact of floods can be reduced by flood preventative measures. These minimise run-off and use **reservoirs** to store excess water. Flood water can be confined to rivers by **embankments** and **relief channels**. Excess water can be removed by increasing the flow rate. For example by widening, deepening and straightening the river channel.



Flood control and prevention

Human activities

- The most effective management of rivers is by a whole-basin approach. In addition to flood control measures, **irrigation** and navigation can be improved. **Dams** and reservoirs can be used to generate **hydroelectricity** as well as providing opportunities for recreation and leisure.
- The upper parts of a river basin are used for sheep farming, quarrying and water storage. High precipitation and narrow valleys are suitable for dam and reservoir construction. The slopes of the valleys can be forested. There are greater opportunities for agriculture and industry further downstream. Estuaries are favourable sites for industry as they allow import and export facilities and the flat land is suitable for building. Often there are large areas of mud that can be reclaimed and used for large industrial sites.

Rivers (1–4)

1 Why is the movement of water between the atmosphere and the earth's surface called a cycle? (1)

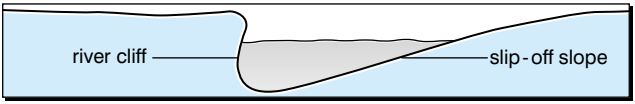
2 How does river water corrade? (1)

3 Which form of river transport is most important in eroding the landscape? (1)

4 Why are waterfalls only temporary features on a river's course? (1)

5 Why is the American term 'cut off' appropriate for an ox-bow lake? (1)

6 Which part of a river's course has the following cross section? (1)



7 Why is there a time lag between the time of maximum precipitation and the peak discharge of a river? (1)

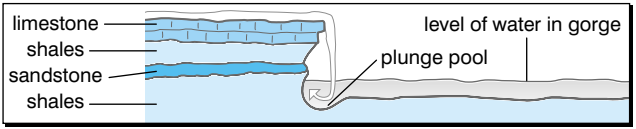
8 What is the difference between a tributary and a distributary? (1)

9 Why do deltas form in the Mediterranean Sea? (1)

10 How may the straightening of a river's course reduce the danger of flooding? (1)

11 Why do rivers erode most when they are in flood? (3)

12 Explain the features shown on the following cross section of Niagara Falls. (3)



13 How can deforestation increase the danger of flooding? (2)

14 Why can water control measures in a river basin be considered multipurpose? (2)

SCORE

1 There is continuous movement of water to the earth's surface (precipitation), across the land (river flow) and back to the atmosphere (evaporation). (1). This can be shown in a diagram.

2 By the abrasive actions of sediments carried by the river on its bed. (1) Remember that abrasion and corrasion both contain 'a', while corrosion and solution don't.

3 Traction. (1) The largest materials erode as they roll along the river's bed.

4 Waterfalls erode backwards as the river smoothes out its profile. (1)

5 The river 'cuts off' the neck of the meander to leave the rest stranded as an ox-bow lake. (1)

6 Middle course. (1)
This is where the river starts to erode laterally.

7 Peak discharge includes water falling directly into the river as well as surface run-off and through flow. (1) Surface run-off and through flow take longer to reach the river.

8 A tributary takes water to the main river, whereas a distributary takes water away. (1) Distributaries are found in deltas.

9 The sea is tideless and there are no strong currents. (1)

10 It increases the speed of flow. (1)
This reduces the danger of the river breaking its banks.

11 They have a greater amount of water and carry a greater load. (1) They flow faster. (1) Relatively, there is less frictional loss so the river is more efficient. (1)

12 The softer sands and shales are eroded more easily and undercut the more resistant limestone. The overlying limestone eventually collapses. (1) The Falls erode backwards leaving a gorge. (1) The river hits the bottom of the Falls to form a plunge pool. (1) This leads to the eventual removal of the waterfall.

13 It increases the rate of surface run-off and decreases the risk of infiltration. (1) This increases the peak discharge. (1) The steeper the limbs of the hydrograph the greater the flood danger.

14 The measures are used for more than one purpose. (1) Dams store water and regulate the flow, but can also be used to generate HEP. (1)

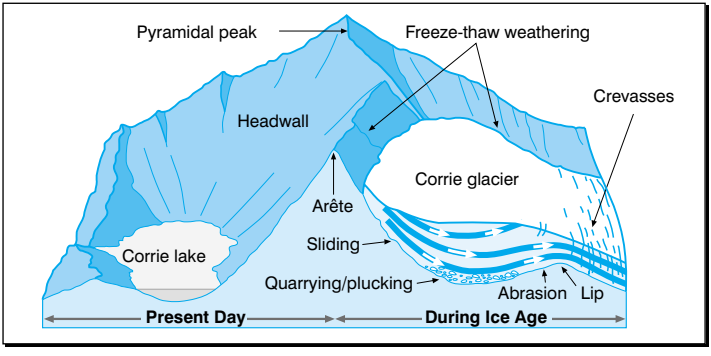
TOTAL

GLACIATION (1)

- There are two main forms of **glaciation**. **Highland** or **valley glaciation** is where ice forms glaciers which flow along valleys. In **lowland** or **continental glaciation** an ice sheet covers a whole area. Highland glaciation is taking place still in mountainous areas such as the Alps and the Rockies. Antarctica is an area of continental glaciation.
- The Ice Age ended 10,000 years ago. The Lake District and the Scottish Highlands show the effects of highland glaciation. East Anglia's landscape is dominated by lowland glaciation features.
- **Glacial erosion** is the result of a combination of two processes: **frost shattering** and **abrasion**. Water freezes in cracks in the rocks, expands and shatters the rock. Rock fragments stick to the underside of the ice by **plucking**. As the ice moves it acts like a giant file.

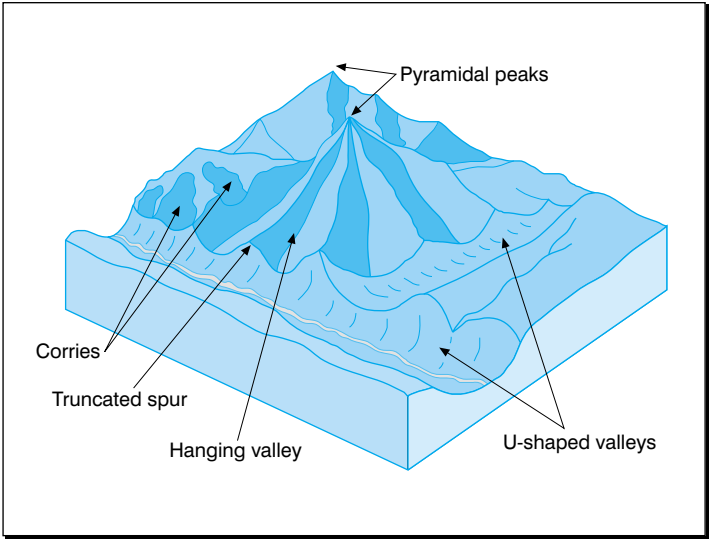
Glacial landforms

- A **corrie** is an armchair shaped circular depression with steep walls on three sides. At the front a rock lip can dam water to form a **tarn lake**. Semi-rotational movement of the ice has enlarged and deepened an existing depression in the mountain. **Arêtes** and **pyramidal peaks** develop where several corries occur back to back.



GLACIATION (2)

- Glaciers are ice flows which start in corries and move down existing river valleys. This creates a **U-shaped glacial trough** with **truncated spurs**. The U-shaped valley is straighter and deeper. **Ribbon** or **finger lakes** form in a glacial trough either by a glacier overdeepening part of the valley floor or by **moraine** blocking the end of a valley.

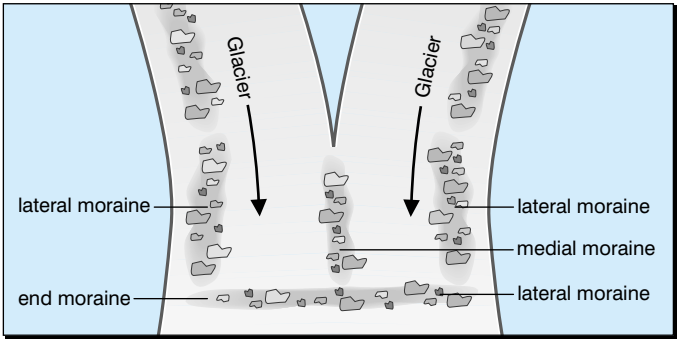


Glaciated highland

- Glaciated highlands have a variety of uses. Their spectacular scenery attracts tourists in both summer and winter. U-shaped and hanging valleys are ideal for HEP stations. Ribbon lakes are natural reservoirs. Artificial reservoirs are built by damming the valleys. Sheep farming is the main type of agriculture. In some areas there is conflict between the various landuses which can cause environmental damage.

Glacial deposits

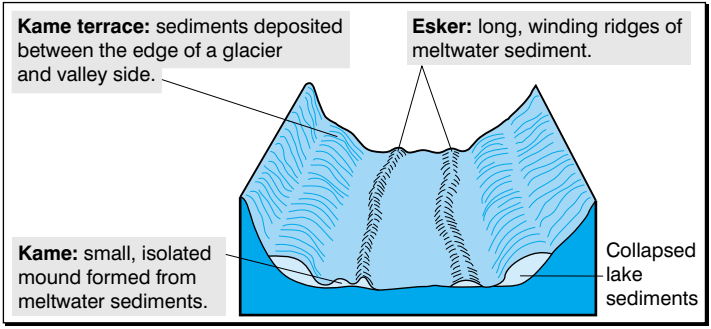
- **Glacial deposition** forms moraines. Unlike river deposits they are unsorted. A moraine will have a mixture of deposits ranging in size from large boulders to the finest rock flour. **Terminal** (end), **lateral** and **medial moraines** are named after the positions they are found in.



Types of moraine

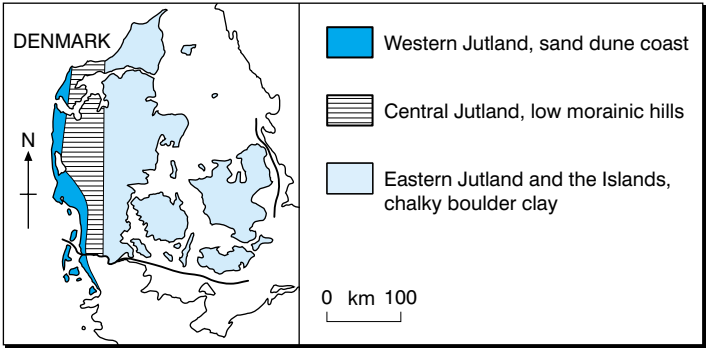
- Material carried underneath the ice is left as ground moraine. The weight of the ice crushes the material to form **boulder clay**. This is deposited as a continuous **till plain** or as a series of egg shaped **drumlins**.
- **Erratics** are rocks that have been transported by ice and deposited in an area of very different geology. **Roches mountonnées** have a gentle up-valley slope formed by abrasion. Plucking causes the down-valley side to be steeper. A **crag and tail** forms when a resistant plug, e.g. a volcanic cone, protects the material being eroded behind by the ice. In this case the gentler slope is on the down-valley side.
- **Meltwater streams** flow within, below and in front of the ice. These transport material and deposit them as fluvial–glacial deposits. These form **kames**, **kame terraces**, **eskers** and **outwash plains**.

GLACIATION (4)


Kame terrace: sediments deposited between the edge of a glacier and valley side.
Esker: long, winding ridges of meltwater sediment.
Kame: small, isolated mound formed from meltwater sediments.
Collapsed lake sediments

Meltwater deposits

- The effects of lowland glaciation are seen in the three physical divisions of Denmark.



Physical geography of Denmark

- Boulder clay or till plains in Denmark and East Anglia are important arable farming areas. The glacial deposits are not too sticky when wet and are good for growing crops. Other moraines do not produce particularly fertile conditions because of their unsorted nature.

Glaciation (1–4)

1 Why is a glacier able to move despite being made of solid ice? (1)

2 What is the main difference between a tarn and a ribbon lake? (1)

3 How could you tell if material had been deposited by water or by ice? (1)

4 What glacial feature can be described as a 'narrow steep-sided ridge'? (1)

5 Name an example of a pyramidal peak. (1)

6 What landform marks the furthest point reached by the ice? (1)

7 How did the 'hanging valley' get its name? (1)

8 What are hanging valleys suitable for the production of HEP? (1)

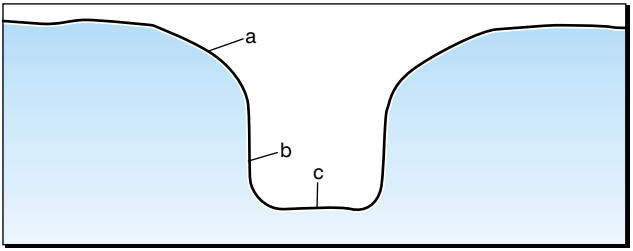
9 Why does the relief of boulder clay or till plain favour the growth of cereals? (1)

10 Why is frost shattering an important process in glacial erosion? (2)

11 Why is there meltwater underneath a glacier or ice sheet? (1)
What is the importance of this meltwater? (1)

12 What evidence is there in the landscape to show the direction of ice movement? (4)

13 Explain the following features in the cross section of a glacial trough. (3)



1 Individual ice crystals within the ice slide across one another. (1) Different parts of the glacier move at different speeds producing tunnels within the ice and crevasses on the surface.

2 Their shape. (1) A tarn adopts the circular shape of a corrie. A ribbon lake is long and thin.

3 Glacial deposits or moraines are unsorted. (1)

4 An arrête. (1)
For example, Striding Edge in the Lake District.

5 The Matterhorn on the Swiss–Italian border. (1)
Horn is an alternative name for a pyramidal peak.

6 Terminal or end moraine. (1)

7 The floor of the hanging valley 'hangs' above the floor of the main valley. (1) The hanging valley is cut by a smaller tributary glacier.

8 They produce a high 'head' of water. (1)
This can turn electricity turbines.

9 It is flat and suited to the use of machinery. (1)
This makes arable agriculture capital intensive.

10 The rocks broken up by frost shattering are plucked by the ice. (1) The rock fragments in the ice are abrasive against the underlying rocks. (1) This question is asking how ice erodes rather than asking for the results of ice erosion.

11 Friction between the moving ice and rock causes heat to melt the ice. (1) The meltwater lubricates the ice helping it to slide. (1) As the ice moves away from the frictional zone it freezes again, expands and shatters more rock.

12 The way drumlins are positioned. (1) Erratics can show the origin of the ice flow. (1) The gentle side of a roche mountonnée faces the direction that the ice has come from. (1) The tail of a crag and tail points in the direction that the ice moving. (1)

13 **a** The 'shoulders' are the remnants of the former river valley. (1)

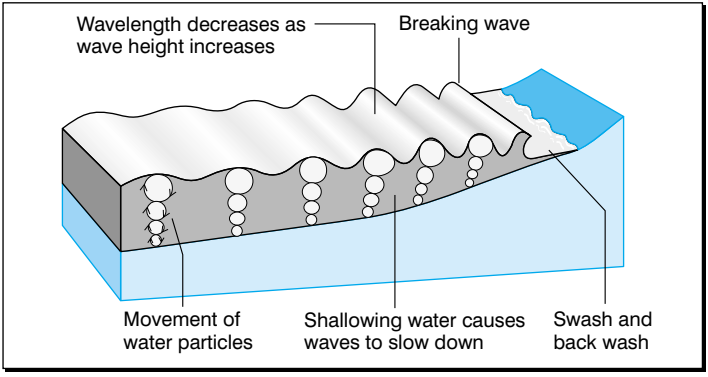
b The truncated spurs result in steep sides. They are the remains of interlocking spurs. (1)

c The U-shaped cross section reflects the shape of the glacier. (1)

TOTAL

Wave action

- The sea erodes, transports and deposits by wave action. Waves are formed by the wind. When waves reach shallower water, friction with the sea bed slows down the bottom of the waves. The wave increases in height until it breaks or plunges. The water runs up the beach to form the **swash**. The **backwash** is the water that runs back down the beach. There is less frictional loss of energy where the offshore gradient is steep.


Wavelength decreases as wave height increases
Breaking wave
Movement of water particles
Shallowing water causes waves to slow down
Swash and back wash

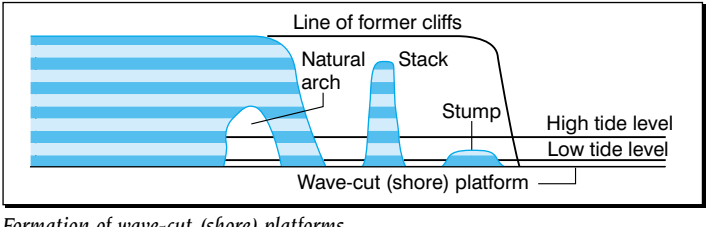
Waves in shallow water

- **Constructive waves** have a strong swash and a weaker backwash. These are more likely to deposit material on the coast. The backwash of a **destructive wave** is stronger than its swash. Destructive waves erode material from the coast. The most powerful waves are caused by strong winds which blow continuously over a long **fetch**.
- Erosion by the sea is the result of a number of processes: **abrasion** or **corrasion**; **corrosion** or **solution hydraulic action** and **attrition**. These are most effective where the coast is made up of less resistant rock, such as sands and clays.

	Processes of wave erosion
Abrasion/corrasion	Sand and shingle carried by waves scour and grind the rocks along the coastline.
Hydraulic action	The pounding effect of water on the coastline during storms. Even the hardest rocks can break up as they are loosened along joints and bedding planes.
Corrosion/solution	The dissolving of rocks by sea water.
Attrition	The wearing away and rounding of sediments (to form sand and shingle) by abrasion and by rubbing against each other.

Coastal features

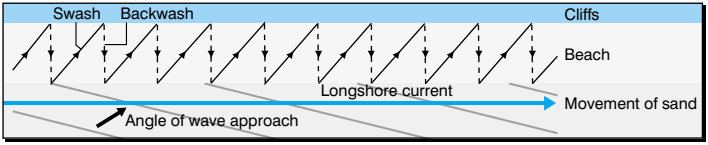
- On an **accordant coast** the **strata** of the rocks lie parallel to the coast giving it a very smooth outline.
- On a **discordant coast** the rock strata are at right angles to the coast allowing differential erosion to occur. This results in the formation of a series of **headlands** and **bays**. Headlands are left when wave action forms bays in areas of less resistant rock. Wave action erodes weaker parts of headlands too. This can result in the formation of **caves**, **arches** and **stacks**.
- **Wave action** forms a notch at the base of a cliff. This undercutting causes the cliff to collapse. As this cycle repeats over time the cliffs retreat inland. The cliffs get higher and steeper. A **wave-cut platform** forms at the base of the cliff. This is covered with beach deposits which are transported from the cliff face and eventually deposited in the sea.



Formation of wave-cut (shore) platforms

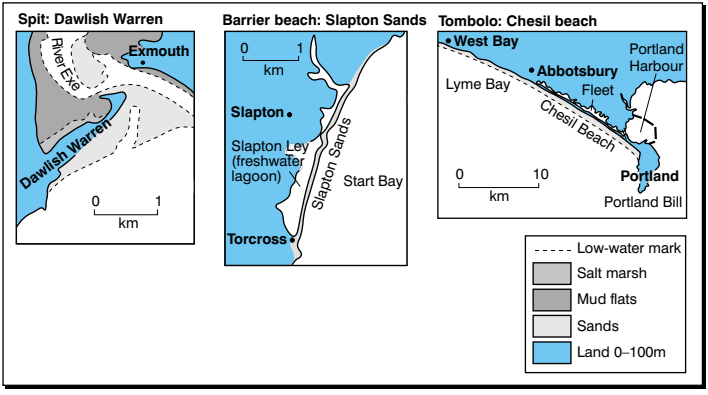
COASTS (3)

- Beaches are accumulations of wave deposits. Some of this material comes from cliff erosion. The rest is transported by rivers or along the coast by wave action. Material is transported along the coast in a zig-zag movement called **longshore drift**. The swash runs up the beach at an angle but the backwash runs straight back down the beach.



Longshore drift

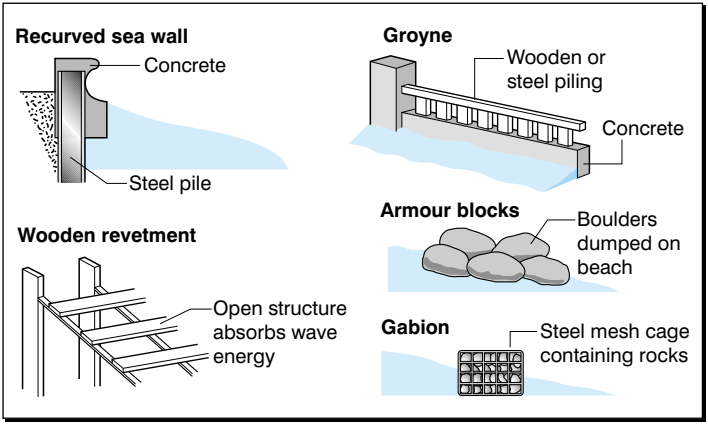
- There are several types of wave depositional features. There are **spits**, **tombolos**, **barrier beaches** and **bay head beaches**. Spits are ridges of sand or shingle that are joined to the mainland at one end. Waves cannot reach the water behind the spit. This allows tidal currents to deposit material which form **mud flats** and **salt marshes**. A **barrier beach** or **bar** is joined at both ends. A tombolo joins an island to the mainland.



- Coastal areas are affected by changes in sea level. If the sea rises or falls the effects are felt worldwide. If land moves then the effects are more localised. If sea level rises, the coast is submerged and **rias**, **estuaries** or **fjords** can form. A fall in sea level forms an emergent coastline with a series of raised beaches above the new sea level.

Coastal management

- Coastal areas need to be managed because both physical and human factors affect them. Coastal erosion can have disastrous effects on people living close to the sea. **Sea walls**, **gabions**, **revetments** and **groynes** defend the coast from wave attack. Global warming is likely to increase the rate of coastal erosion. Some argue that it will become too expensive to defend the coast.



Methods of coastal protection

- Tourism is very important in coastal areas. Trampling over **sand dunes** destroys vegetation and **exposes** the dunes to wind erosion. Sun-tan lotion and boat oil can cause pollution. Careful planning is required to protect the environment.

Coasts (1–4)

1 What is the fetch of a wave? (1)

2 Why is the east coast of Australia good for surfing? (2)

3 "Air is compressed back into cracks in the rock by water. As the waves retreat, the pressure is released. Air implodes into the vacuum left bringing fragments of rock out with it."
What process of wave erosion is being described? (1)

4 Name an example of a stack. (1)

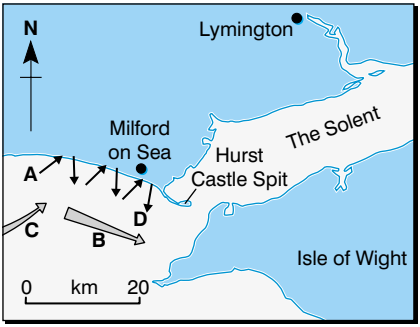
5 What is wave refraction? (1)

6 Why may the building of a groyne increase the danger of coastal erosion further down the coast? (2)

7 Why is global warming likely to increase the rate of coastal erosion? (1)

8 Why are ports more often sited on rias than fjords? (2)

9 Study the diagram. Match the letters with the following words or phrases: direction of swash; prevailing wind; direction of backwash; direction of longshore drift. (4)



10 Why has Hurst Castle spit developed at this particular point on the coast? (1)

11 What determines the direction of the backwash? (1)

12 Suggest three ways that could be used to reduce damage to a coastal environment by tourists. (3)

SCORE

1 The distance of open sea over which the wind blows. (1) This distance has a greater effect on the size of waves than the strength of the wind.

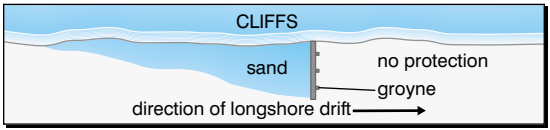
2 It faces the Pacific Ocean, the largest ocean in the world. (1) The winds blow over a fetch of more than 6,000 km. (1)

3 Hydraulic action. (1) Note the difference between this and the hydraulic action of a river.

4 The Needles. (1) Off the western edge of the Isle of Wight.

5 The bending of a wave around a headland. (1) This concentrates the erosional power of the wave on the headland.

6 Sand is the best natural form of sea defence. (1) A groyne prevents sand reaching other parts of the coast, leaving cliffs open to wave attack. (1)



7 There will be a rise in sea level because of melting ice caps . (1) Low-lying coastal areas will be in increased danger of flooding.

8 Fjords are found only in sparsely populated polar latitudes. (1) Their sides are too steep and there is a lack of flat land along the side of the fjords on which to build a port. (1) Plymouth and Milford Haven are major ports built on rias in Britain.

9 A – direction of swash D – direction of backwash
C – prevailing wind B – direction of longshore drift. (4)

10 There is a marked change in the direction of the coast. (1) Spits frequently form at river mouths too, e.g. Orford Ness in East Anglia.

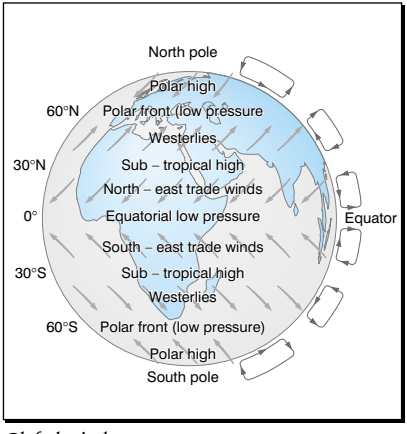
11 Gravity. (1) The wave runs straight down the beach slope.

12 Replanting marram grass on dunes damaged by trampling. (1) Way-marking trails to keep visitors on footpaths. (1) Organised litter and warden patrols. (1) Authorities could also provide amenities for tourists away from most sensitive areas.

TOTAL

Weather and Climate (1)

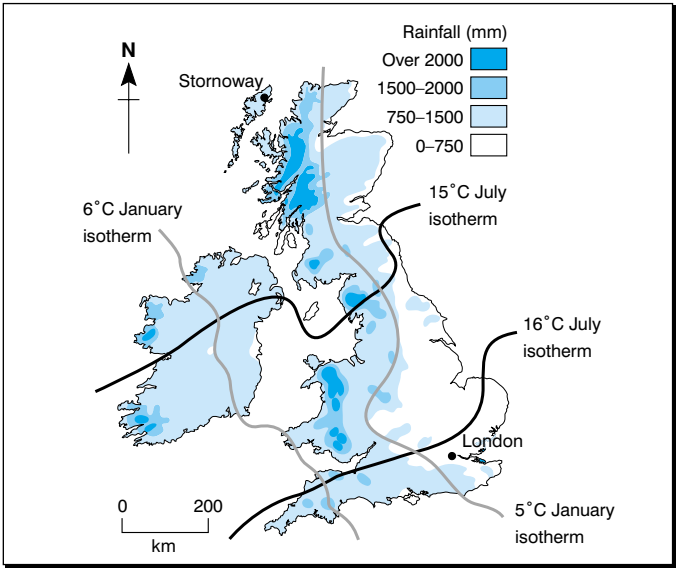
- **Weather** is the day-to-day variations of temperature, precipitation, sunshine, wind and atmospheric pressure. **Climate** is the seasonal average of the weather based on records kept for a minimum of 35 years.
- The location of a place determines its climate. Temperature generally decreases with latitude because the sun's rays are concentrated in smaller areas closer to the Equator. The rays have to pass through less atmosphere too. Temperatures are also affected by variations in the length of day and night. Temperatures fall on average 6.5 °C for every 1,000 m altitude.
- The further a place is from the sea the more extreme or **continental** its climate (e.g. Kiev). The location will have a greater range of temperature. This is because of the effect of the sea which warms up slowly in the summer and cools less quickly in winter. Precipitation decreases with increasing distance from the sea. An inland location is more likely to have a summer maximum of precipitation. Places near the sea have a **maritime climate**.
- Winds are air movements from high to low pressure. Winds produce a global pattern of pressure and wind belts. Some locations, e.g. the British Isles, remain in the same wind belt all year around. Mediterranean areas lie in a westerly wind belt in winter but receive easterly, offshore winds in summer. This produces wet winters and a period of summer drought. The great extremes of temperature



Global winds

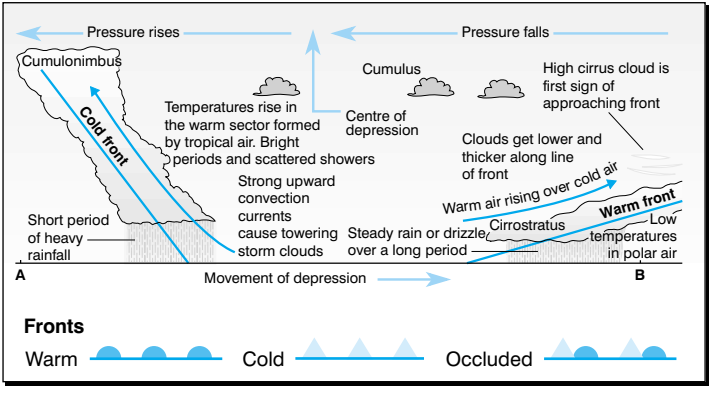
in the centre of large landmasses cause seasonal changes in pressure. This results in a seasonal reversal of wind directions.

- The British Isles have a cool temperate maritime climate. The western parts are wetter than the east because prevailing winds blow from the west off the Atlantic Ocean. The winds rise over the higher land in the west of Britain, then cool and condense to produce precipitation. The east is in a **rain shadow**.
- In winter the **isotherms** run north to south with the warmest areas being in the west. The Atlantic Ocean and the **North Atlantic Drift**, a warm ocean current, are responsible for this. In summer the south of Britain is warmer than the north because of the effect of latitude on isotherms.



Distribution of precipitation in the British Isles

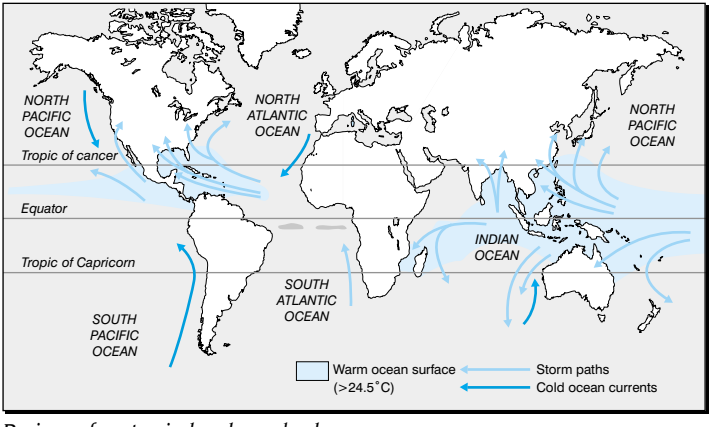
- Precipitation is caused by moist air rising, which makes water vapour cool and condense. **Relief** or **orographic rainfall** forms when air is forced to rise over mountains. **Frontal** or **cyclonic rain** occurs where warm air rises over cold air. High temperatures can result in **convectional rainfall**.
- **Depressions** are areas of low pressure which develop along the **Polar Front**. Winds blow anticlockwise into the centre of a depression. Fronts separate cold air from warm air. Steady rain develops at a **warm front**. Heavier rain, sometimes with thunder and lightening, marks the passing of a **cold front**.



Weather conditions in a depression

- **Anticyclones** are areas of high pressure. The **isobars** are widely spaced so conditions are usually calm. Any winds blow in a clockwise direction. In winter anticyclones can bring foggy weather or very bright conditions with sharp frosts. In summer anticyclones bring sunny conditions with above average temperatures.
- Weather forecasting relies on satellite images as well as weather charts. Satellites can transmit both visible and infra-red images in black and white.

- Extreme weather conditions present serious hazards to people. These may be short term or long term. Weather can cause massive damage to property, crops and livestock as well as loss of life. The impact of extreme weather conditions is greatest in poorer countries.
- **Hurricanes**, **typhoons** and **cyclones** are violent tropical storms. They are areas of extreme low pressure which develop over warm seas. Very strong winds, cloud and heavy precipitation accompanied by sea surges are features of these storms.



Regions where tropical cyclones develop

- Droughts can be seasonal. If they develop over a long period they become significant hazards. The Sahel in West Africa, and Southern Spain have both suffered serious droughts in recent years. Droughts may be caused by physical factors but the effects are often made worse by human actions.

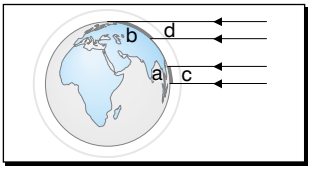
Weather and climate (1–4)

1 Why do climate statistics have to be based on a minimum of 35 years' observations? (1)

2 Why is it sometimes said that the British Isles have "no climate only weather"? (1)

3 What is meant by a range of temperature? (1)

4 How does the following diagram explain why it is hotter nearer the Equator than the poles? (1)



5 Why does temperature decrease with altitude? (1)

6 What is a maritime climate? (1)

7 What is dew point? (1)

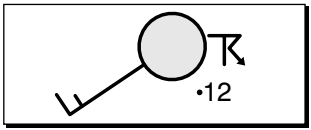
8 What front is found where warm air is replaced by cold air? (1)

9 Why do poorer countries suffer more from climatic hazards? (2)

10 Explain how the climate of Penzance in South-west England differs from that of Norwich in East Anglia. (3)

11 Name three different types of precipitation. (3)

12 Describe the weather conditions at the following weather station. (4)



SCORE

1 To work out the average conditions. (1)
A shorter period could be unfairly influenced by abnormally high or low figures.

2 The day-to-day weather conditions in the British Isles vary so much that it is difficult to suggest what the average conditions are. (1) The British Isles lie on the Polar Front which separates cold polar air from warm tropical air.

3 The difference between the maximum and minimum average monthly temperatures. (1) The months of January and July are normally used.

4 The sun's rays are less effective near the Poles, as they heat a larger area. (1)

5 The atmosphere gets less dense with increasing altitude, so it absorbs less radiated heat. (1) This is why snow can be found on Mount Kenya despite it being on the Equator.

6 A climate that is influenced greatly by the sea. (1)
These climates tend to have a relatively low temperature range and higher precipitation.

7 The temperature at which water vapour in the air condenses to form water droplets. (1) The height at which dew point is reached marks the base of a cloud.

8 A cold front. (1) Remember that a front is named after the type of air that is replacing the existing air.

9 They usually have poorer evacuation and relief measures. (1) People are forced to live in disaster prone areas. (1) Other reasons include: more sophisticated forecasting in richer countries; and more resistant housing and infrastructure.

10 The temperature range is smaller in Penzance (1) and the total precipitation is higher. (1) Penzance has a winter maximum of rainfall compared to Norwich's slight summer maximum. (1)
Norwich's climate is less influenced by the sea.

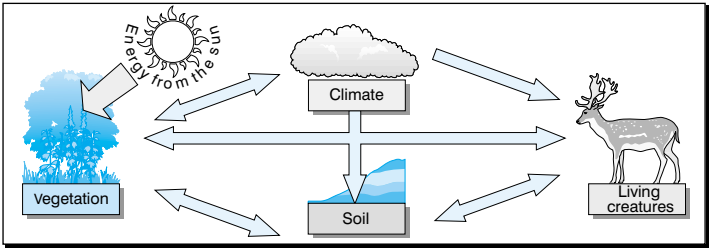
11 Relief (or orographic) (1), frontal (or cyclonic) (1) and convectional. (1) Remember that the only difference between these is what causes the air to rise in the first place.

12 There is complete (8 oktas) cloud cover. (1) The wind is south westerly at a speed of 13–17 knots. (1) There have been thunderstorms. (1) The temperature was 12°C. (1)

TOTAL

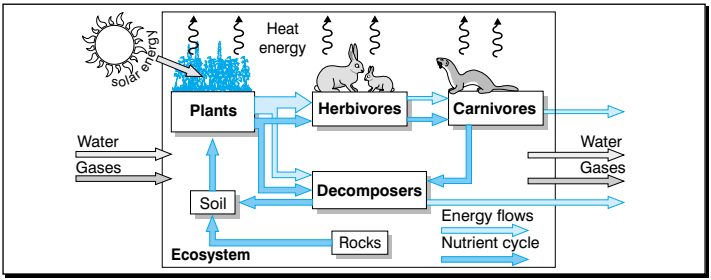
The Ecosystem Concept (1)

- An **ecosystem** is the relationship between **living** and **non-living things**. The living parts of an ecosystem are the animals and plants. The non-living things include rocks, climate, soil and water. They are linked together by a series of **energy** and **nutrient flows**.



Ecosystems

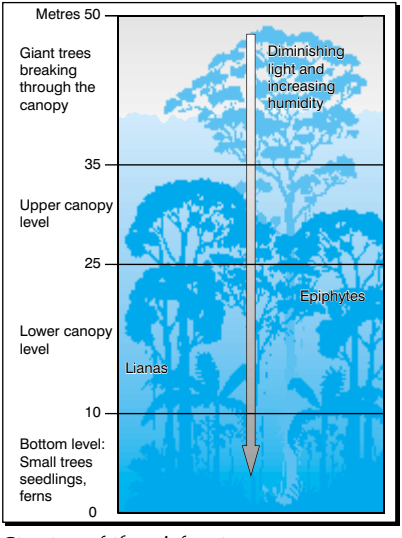
- **Energy** is transferred from animals to plants through a **food chain**. The chain has a number of **trophic levels**. Green plants or **primary producers** occupy trophic level one, **herbivores** occupy trophic level two, and **carnivores** tropic level three. Humans are mostly at the top of the food chain. There is a decrease in the number of individuals in each successive tropic level. Ecosystems cycle **mineral nutrients** such as nitrogen, phosphorous and potassium through a series of stages.



Energy and nutrient flows

Rainforests

- The **tropical rainforest** is an important ecosystem. Rainforests occur in the Equatorial lowlands, in the Amazonian and Zaire basins, and in parts of Indonesia and Malaysia. The rainforests have enormous **biomass** and **biodiversity**. A year long growing season with a constant temperature of 25–30 °C and rainfall of 1,500–5,000 mm per year provide ideal growing conditions.
- The rainforest has a definite structure. **Emergents** reach 50 metres height, with the **main canopy** reaching about 35 metres. There is relatively little undergrowth, apart from flowering plants, grasses and ferns. **Lianas** and **epiphytes** hang from trees. There are many different species, but they do not occur in pure strands. The trees are **deciduous** but the forest always appears green.
- The rainforest is adapted to its climate. Trees have thick, leathery leaves to protect them against sunlight. The drip tips of the leaves shed water easily. The trees are tall and shallow rooted and have buttress roots for added support.
- Rainforests are the main source of tropical hardwoods. The forests are being cleared rapidly, causing a loss of habitat. This may contribute to global warming. Rainforests are also an important source of wealth for many LEDCs.



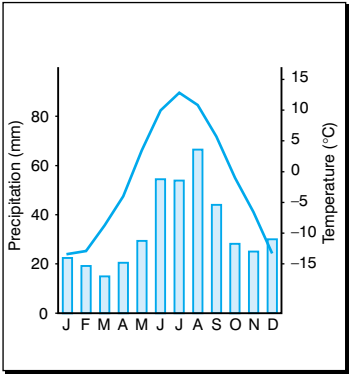
Structure of the rainforest

Mediterrranean vegetation

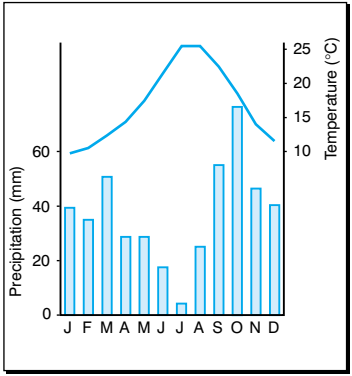
- **Mediterranean climate** is found on the western sides of continents between 30° and 40° North and South, e.g. southern Europe, central Chile, South Africa, south and west Australia, and the north island of New Zealand. Summers are hot and dry, with an average temperature of 25–30°C. Winters are mild and wet with temperatures averaging 8–12°C.
- The natural forest vegetation of Mediterranean areas has been replaced by humans. The vegetation is mainly scrub called **garrigue**, **chapparel** or **macquis**. This consists of sweet smelling plants such as gorse, heather, rosemary and lavender. The vegetation has developed characteristics which allow it to survive the long summer drought. Long roots tap underground water, and the thick waxy leaves reduce transpiration. Bulbs and tubers flower in spring when there is still moisture. Cacti store water in the plant tissue.

Coniferous forest

- The areas of northern Canada, Scandinavia and Russia between 50 and 66°N are covered with **coniferous forest** (taiga). The forest is dominated by conifers such as pine, spruce, fir and larch. They are the world's main source of **softwood**. Most countries in these areas have developed a **sustainable management plan** for their timber resources and have an active replanting programme.
- The trees can survive the extreme climate. The growing season is short with six months below freezing. The total precipitation is low, mainly falling in the summer. Most of the precipitation is 'locked up' in snow. The vegetation has adapted to this climate. Conifers keep their leaves all the year around and **photosynthesise** as soon as the temperature reaches 6°C. The needle shaped leaves reduce moisture loss. The cone shaped nature of the trees allows snow to slip off easily without damaging the leaves.

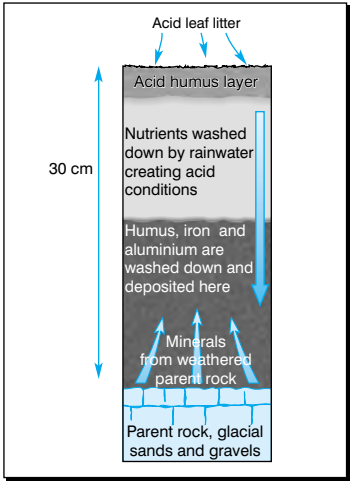


Climate graph for Inari (69°N), Finland



Climate graph for Mallorca (39°N), Spain

- Soils under coniferous forests are shallow and acidic. The minerals are leached out by rainwater. Low temperatures mean that fallen needles do not decompose easily. The soils therefore lack humus.
- Soils are poor and regeneration of forests is very slow. Environmental concerns are very important in this ecosystem.


Acid leaf litter
Acid humus layer
30 cm
Nutrients washed down by rainwater creating acid conditions
Humus, iron and aluminium are washed down and deposited here
Minerals from weathered parent rock
Parent rock, glacial sands and gravels

Podsol soil profile

The ecosystem concept (1–4)

1 What is an ecosystem? (1)

2 Draw a diagram to show the relationship between primary producers, primary consumers, secondary consumers and decomposers. (1)

3 What is a biome? (1)

4 What is biomass? (1)

5 Why do rainforests always appear green? (1)

6 Why is there so little undergrowth in a rainforest? (1)

7 Name a crop grown commercially in Mediterranean areas that can survive the summer drought. (1)

8 What type of vegetation would you expect at a location experiencing the following temperature and precipitation figures? (1)

J	F	M	A	M	J	J	A	S	O	N	D	
25	24	23	21	17	15	12	11	13	18	21	23	°C
4	6	15	28	43	48	60	65	54	37	19	8	mm

9 What is a podsol? (1)

10 How does the needle shape of conifer leaves help to reduce moisture loss? (1)

11 Why are there rarely more than four or five trophic levels in a food chain? (2)

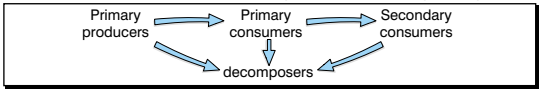
12 What are the stages in a nutrient cycle? (4)

13 Why is commercial forestry often not sustainable in rainforest areas? (2)

14 Why do rainforests have such a rich biodiversity? (2)

1 The relationship between living and non-living things. (1)

2



(1)

3 A natural vegetation zone at a global scale. (1) Rainforest, Mediterranean vegetation and coniferous forests are all biomes.

4 The total mass of all the organisms in a particular ecosystem. (1) Rainforest has a biomass of 11,000 tonnes/hectare.

5 The trees do not lose their leaves all at the same time. (1) Equatorial regions do not have definite seasons.

6 The dense canopy prevents a lot of light reaching the forest floor. (1) Light is important for plant growth.

7 Olives or grapes. (1) Olives have waxy leaves. Vines have long roots to tap underground water.

8 Mediterranean. (1)This is a Southern hemisphere location. The warmest and driest months are from October to March.

9 The type of soil found beneath coniferous forests. (1)

10 The smaller surface area means that there are fewer pores on the surface of the leaf through which moisture can be lost. (1) The correct name for these pores is stomata.

11 There is a reduction of energy (1) from one tropic level to the next. (1)

12 Weathering of rocks releases mineral nutrients into the soil. (1) Plants take up these minerals through their roots. (1) Herbivores eat plants and carnivores eat herbivores so that the nutrients are passed along the food chain. (1) When plants and animals die, decomposers release the nutrients back into the soil. (1) This can be shown very clearly in a diagram.

13 It represents one of the few sources of income in these areas. (1) Exploiting valuable tropical hardwoods destroys much of the forest's biodiversity. (1)

14 There are great variations in different parts of the rainforest ecosystem. (1) The main parts are the emergents, the canopy and the forest floor. (1) Each part has its own microclimate.

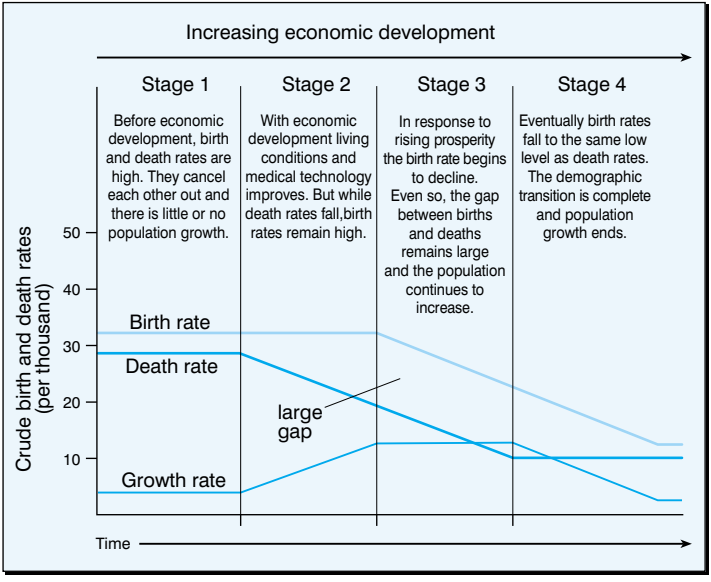
TOTAL

Population density

- **Population density** is the number of people per unit area. It is calculated by dividing the total population by the area. The average population density of the world is low. The global pattern of population density is very uneven. Around 20% of the world's population lives in less than 10% of the land.
- Physical factors determine population distribution. Climate is an important factor. There tends to be denser population where climate favours agriculture. Very dry and cold areas can support only a sparse population. Outside the Tropics mountains are sparsely populated. Fertile soils and water encourage high population densities. Inaccessibility makes rainforests sparsely populated.
- Human factors can attract population to inhospitable areas such as deserts, e.g. mineral exploitation. Population is greater in highly industrialised regions. Dense population can be supported by technologically advanced societies. The regions of highest population density tend to be those which have the longest history of settlement.

Birth and death rates

- The world population is growing at an ever increasing rate. This is likely to continue until 2050. Population change is the number of births minus the number of deaths plus or minus the number of people migrating. The difference between the **crude birth rate** and the **crude death rate** is the **rate of natural increase**.
- **MEDCs** have gone through four distinct stages of population change. This is called the **demographic transition**. It is not clear whether **LEDCs** will follow the same pattern.
- Birth rates are highest in LEDCs, averaging 28 per 1,000 compared with 12 per 1,000 in MEDCs. Death rates vary more than birth rates. In LEDCs they vary from 5 to 20 per 1,000. In MEDCs the average is about 10 per 1,000.

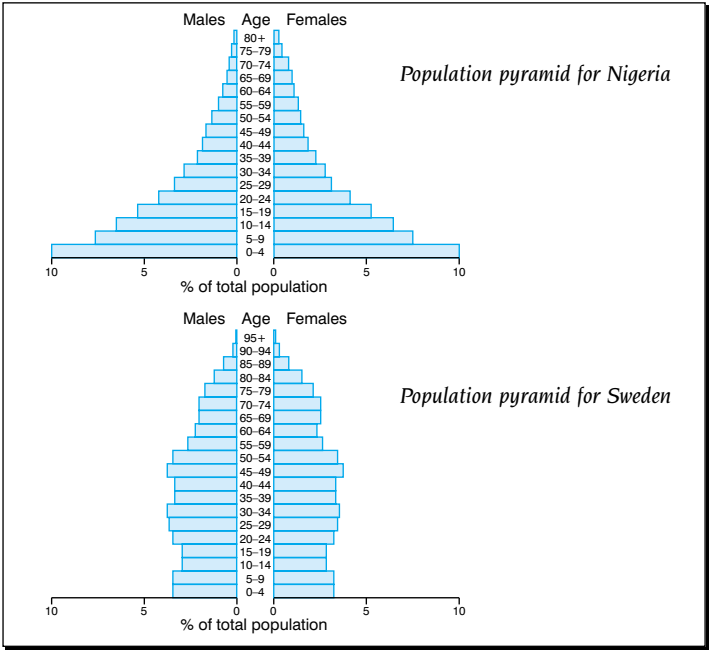

Increasing economic development
Stage 1
Stage 2
Stage 3
Stage 4
Before economic development, birth and death rates are high. They cancel each other out and there is little or no population growth.
With economic development living conditions and medical technology improves. But while death rates fall,birth rates remain high.
In response to rising prosperity the birth rate begins to decline. Even so, the gap between births and deaths remains large and the population continues to increase.
Eventually birth rates fall to the same low level as death rates. The demographic transition is complete and population growth ends.
Crude birth and death rates (per thousand)
50
40
30
20
10
Birth rate
Death rate
large gap
Growth rate
Time

The demographic transition

- The **birth rate** is higher where there is a high proportion of women of reproductive age (15–49). High **infant mortality rates** encourage parents to have more children. The knowledge and use of **contraception** affects birth rate. Birth rates remain high if children are needed to work in agriculture or to look after their parents in old age. Birth control programmes can be important.
- **Death rates** increase where there is a larger proportion of older people. Poor diet, housing conditions and healthcare can increase the death rate. Constant pregnancies can increase the death rate among women. In MEDCs modern living can increase the risk of death from cancer, heart disease and traffic accidents.

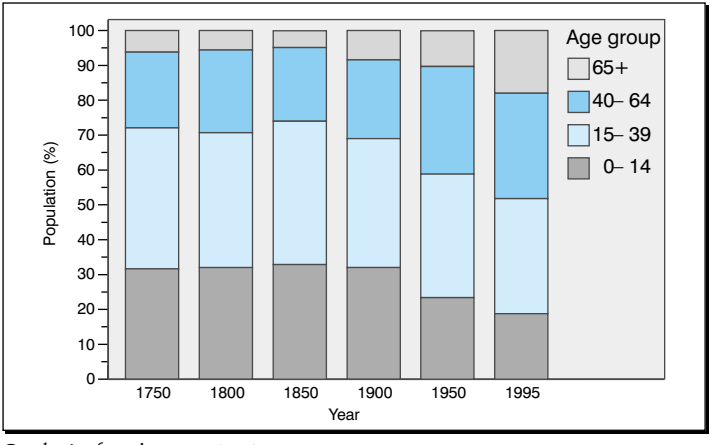
Population structure

- **Population structure** can be shown on an **age–sex pyramid**. Births, deaths and migration patterns can affect the shape of the pyramid. The population pyramid for a LEDC has a broad base and steeply sloping sides. This shows the young nature of the population because of the high birth rate. The steep sides reflect the high infant mortality rate and the low **life expectancy**. The pyramid for a MEDC has a narrow base and straight sides. Low birth rates over a long period mean that there are relatively few young people. Death rates are high only in extreme old age.



Population Distribution (4)

- The structure of a country's population has an important effect in future years. In an LEDC the youthfulness of the population means that there will be a large number of potential parents. This can keep the birth rate high. Unless the birth rate falls a decline in **infant mortality** will increase the width of the pyramid base. The country will then experience an ever increasing rate of population growth.
- Countries such as Bangladesh have set up government birth control programmes. The age of marriage has been raised and contraceptive education is more widely available. The education of women has been encouraged. The higher the level of female literacy the lower the birth rate tends to be.
- In MEDCs higher living standards and better healthcare have increased life expectancy. There is an increased need for state pensions and a greater pressure on medical and welfare services. This puts pressure on the working population to support the increasing proportion of older people, e.g. tax raises. In both LEDCs and MEDCs there is an increasing dependency population.



Sweden's changing age structure

Population distribution (1–4)

1 Why is population density expressed per unit area? (1)

2 France has a population of 56,000,000 and an area of 547,026 km^2. What is its population density? (1)

3 Why are some parts of the desert in the Middle East densely populated? (1)

4 The crude birth rate in Australia is 19/1000. The crude death rate is 8/1000. What is Australia's rate of natural increase? (1)

5 Why may this figure not give a true picture of the population change in Australia? (1)

6 What stage of the demographic transition do many of the LEDCs appear to be passing through? (1)

7 Why is the rate of natural increase greater in LEDCs than it ever was in the MEDCs? (1)

8 What is meant by the 'greying of the population'? (1)

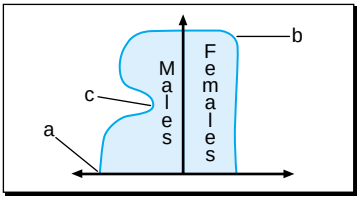
9 Why are government sponsored birth control programmes not always successful? (2)

10 Why is most of Western Europe densely populated? (3)

11 State two features of the growth in world population. (2)

12 Why does there appear to be a link between the level of female literacy and the birth rate? (2)

13 State three reasons why a country may have the following shape to its population pyramid. (3)



SCORE

1 In order to compare countries/areas of different sizes. (1)
Population density is usually expressed per square kilometre.

2 102 persons per km^2. (1)
Remember to give the units.

3 They are important oil producing regions. (1)
The money from oil allows the lack of water to be overcome.

4 11/1000. (1) Remember that birth rates and death rates are expressed as a rate per 1,000.

5 It does not include the figure for migration. (1)

6 Stage 2 (1). The stage of high birth rate and declining death rate.

7 The death rate in LEDCs is declining at a much greater rate than it did at the time of the greatest population increase in MEDCs. (1) This is because LEDCs have much better healthcare compared to say England in the nineteenth century.

8 The ageing of the population. (1)

9 Low levels of literacy mean that family planning education may not be understood. (1) There may be social or religious objections to contraception. (1)
High infant mortality is also significant.

10 The climate is generally moderate allowing efficient agriculture. (1) Industry has developed because of the availability of raw materials and technological know-how. (1) The area has a long history of settlement. (1)

11 It is growing (1) at an ever increasing rate. (1)

12 Educated females understand birth control methods better. (1) Females have greater career hopes. (1) The low status of women in many LEDCs is a very significant contribution to high population growth rate.

13 **a)** A reduced birth rate. (1)
b) Relatively large proportion of older people. (1)
c) The out migration of young males. (1)

TOTAL

MIGRATION (1)

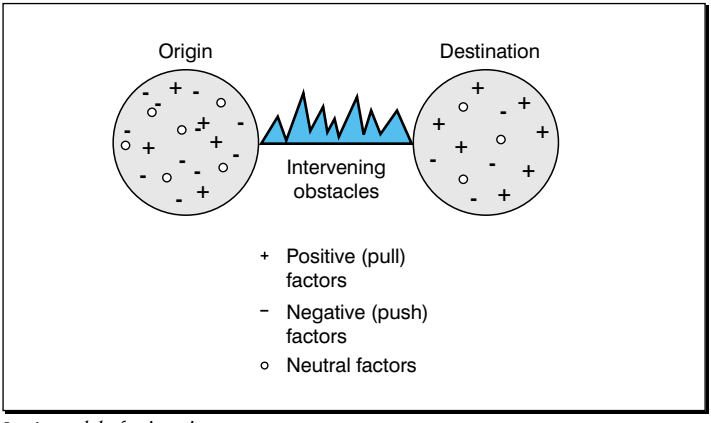
- **Migration** is a movement of people which involves a permanent or semi-permanent change of residence. **Emigrants** leave a country. **Immigrants** enter a country. In LEDCs most people move from rural to urban areas. In MEDCs migration is often the other way around. Some people move of their own free will. Refugees are migrants who are forced to move.

Push–pull factors

- Migration occurs for many different reasons. People moving for a new job or for a better standard of living are economic migrants. Moving to join other members of the family or to get better medical, welfare or educational facilities are social reasons for migration. **Refugees** migrate because of political reasons, e.g. persecution, or because of environmental disasters.
- Migration can be explained by **push** and **pull factors**. Push factors are the disadvantages of a migrant's existing home. Pull factors are attractions of the new location. There are obstacles to migration such as the cost of moving or family connections.

Push factors from countryside	Pull to towns and cities
Land shortage owing to inheritance laws, sub-division of land and population pressure.	Prospects of a higher standard of living.
Unemployment in agriculture.	More opportunities in industry and services.
Poverty and crop failure.	Higher wages in urban jobs.
Debts in rural areas, especially among tenant farmers.	Less interest on loans.
Natural disasters.	Fewer natural disasters.
Poor medical facilities.	Better medical facilities, clinics and hospitals.
Lack of educational opportunities.	Greater number and better quality of schools.
Poor transport, housing, water, electricity, and sewage disposal.	Prospect of better services.
Traditional way of life with limited social facilities for young people.	Attraction of the bright lights of the city. Media, entertainment, television and radio are all more accessible.

Rural–urban migration in LEDCs: push and pull factors



Lee's model of migration

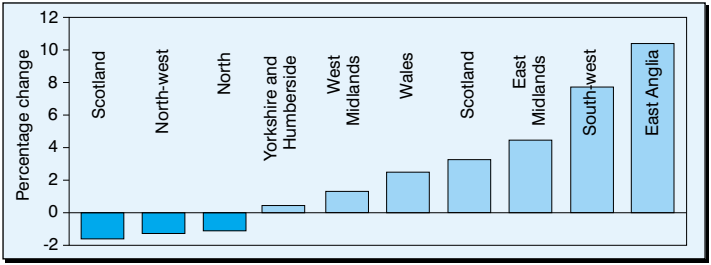
- Young adults between the ages of 15–40 who are better educated are most likely to migrate. In South America women are most likely to migrate, whereas in Africa a typical migrant is male.

Migration in LEDCs

- **Rural–urban migration** in LEDCs has caused rapid **urbanisation**. Farming in rural areas is often unprofitable and the countryside frequently suffers drought and flooding. Medical facilities are poorer in rural areas and infant mortality is often quite high. Malnutrition is common too. In urban areas there is a greater range of services and greater opportunities for paid employment.
- Rural–urban migration in LEDCs has led to the growth of **shanty towns** in urban areas. The rapidly increasing urban population puts great pressure on housing and services. The migrants provide industry with cheap labour. The rural areas suffer because of the subsequent fall in birth rate and food production. They gain some benefit from the money sent back by migrants living in urban areas.

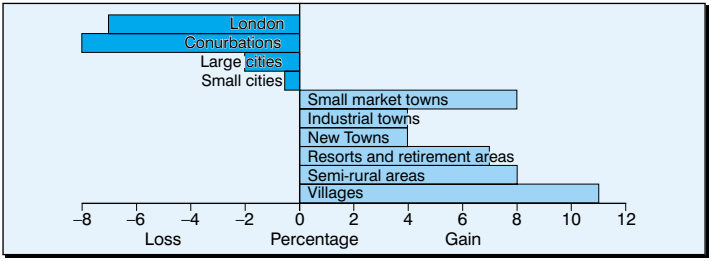
Migration in MEDCs

- Migration in MEDCs is largely urban–rural. This shift is called **counterurbanisation**. Rural areas experience a **net migrational gain**, whereas urban areas, particularly large conurbations suffer a **net migrational loss**. In the UK in addition to counterurbanisation there has been migration from North to South.



Population change by region, 1981–91.

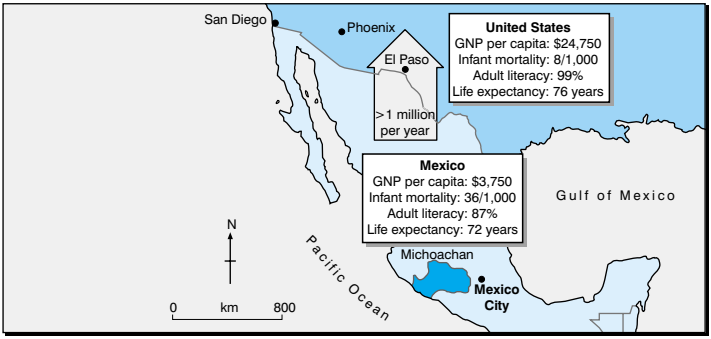
- Counterurbanisation is the result of three factors. More people own cars. This allows people to live in rural areas but commute to work in urban areas. Many people think that rural areas offer a better quality of life, with less pollution, traffic congestion and lower levels of crime. Increasing numbers of people are moving to the countryside and coastal areas when they retire.



Population change according to type of area in England and Wales

International migration

- Population movement between countries is called **international migration**, e.g. from Caribbean countries and the Indian sub-continent to the UK. This is less common than **internal migration** because of the distances involved and political restrictions. There is a lot of illegal migration between poor and rich countries, e.g. between Mexico and the USA.
- In the mid 1990s there were about 50 million refugees, half of whom were forced to leave their country. The vast majority of these refugees were in LEDCs. Most refugees are victims of war, or ethnic and religious tensions. Other important factors are food shortages and natural disasters.
- Migration brings advantages and disadvantages to both the sending and the receiving countries. The movement of people from LEDCs may reduce population pressure. However, the countries may lose the better educated or more skilled people. Migration also produces an unbalanced population structure. The MEDCs obtain cheaper labour and increased knowledge of new cultures and foods. However, racial tension can develop as migrants compete with the native population for jobs.



Global movement of political refugees

Migration (1–4)

1 Why is going away on holiday or commuting to work not considered migration? (1)

2 How may the inheritance laws in many LEDCs encourage migration? (1)

3 People who migrate from a rural area to a large urban area a long distance away tend to move in a series of shorter stages. Why is this? (1)

4 What is depopulation? (1)

5 Rising sea level caused by global warming has forced many people to leave Bangladesh. Is the reason for this migration social, economic, environmental or political? (1)

6 Why are better educated or more highly skilled people more likely to migrate from rural areas? (1)

7 What is counterurbanisation? (1)

8 Give one reason why more Italians have emigrated to Germany than Spaniards. (1)

9 Why is there so much illegal migration from Mexico to the USA? (1)

10 What is gentrification? (1)

11 Name two advantages for a country where large number of migrants have settled. (2)

12 Why is there a greater number of refugees in LEDCs? (3)

13 Why can migration be described as a 'selective process'? (3)

14 Why have many counties along the south coast of England seen a big increase in population in recent years? (2)

SCORE

1 There is no permanent or semi-permanent change of residence. (1)
2 Land is divided equally among children. Over a number of generations the small farms become uneconomic. (1)
3 There are fewer obstacles to a migrant over a short distance. (1)
4 The decline in population because of migration. (1) This is different to a natural population decrease where death rate exceeds birth rate.
5 Environmental. (1)

6 They have enough money to make the move. (1)

7 The movement of people from urban to rural areas. (1) Remember that this is most evident from conurbations and larger urban areas. Small urban areas may still be increasing in population.
8 Italy is closer. (1) Migration studies suggest that as distance increases the number of migrants decreases.
9 There is a great difference in the standard of living between the two countries. (1) GNP per head in the USA is over six times that of Mexico.
10 The process by which better-off people move into working class areas of cities. (1) This is the opposite of counterurbanisation.
11 Increased supply of labour. (1) Increased knowledge and appreciation of different cultures. (1) Indian and Chinese restaurants are enjoyed by many people in the UK.
12 There is greater political instability. (1) Strong tribal loyalties can lead to ethnic hostilities. (1) Many LEDCs lie in the Tropics where the risk of natural hazards is higher. (1)
13 Migrants are often of a particular type. (1) Migrants are largely of one gender. (1) Younger people are more likely to migrate. (1)
14 It is part of the North–South shift in population. (1) The coast is attractive and winters tend to be milder, so many people retire there. (1) The counties of South-west England, e.g. Devon and Cornwall, have seen sizeable increases in population for these reasons.

TOTAL

Settlement Patterns (1)

- There are two types of settlements: **rural** and **urban**. Rural settlements have a number of characteristics that make them different from urban settlements. The former are usually smaller, with fewer shops and services. Rural settlements have a lower population density, and a larger percentage of the population works in farming, forestry, quarrying, etc.
- A **settlement pattern** describes the distribution of rural settlements across an area. Physical geography tends to cause an irregular distribution, as settlements usually cluster in areas with more favourable resources. A **dispersed** settlement pattern consists of isolated **farms** and/or small **hamlets**. In a **nucleated** pattern there are a number of **villages**.

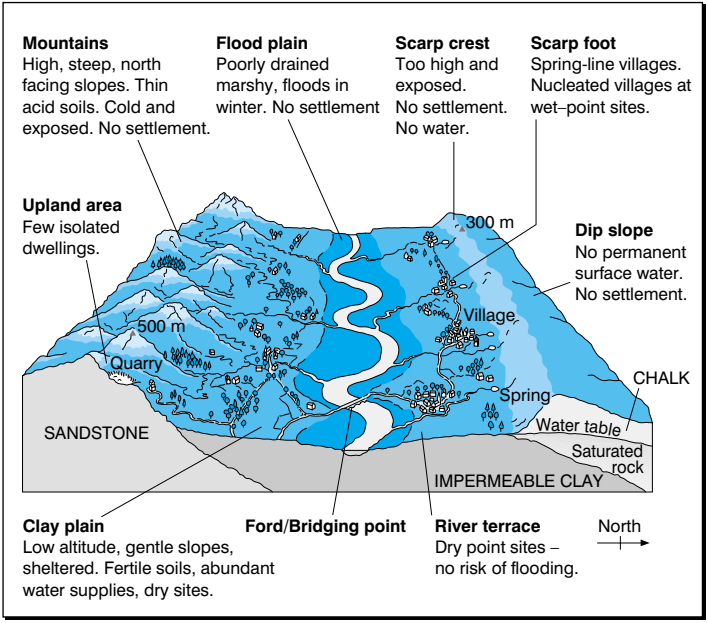
Site and situation

- An individual **settlement's** location can be described in terms of its **situation** and **site**. The situation of a settlement is its position in relation to the surrounding area. The site is the actual land on which a settlement is built. The site is described in terms of the physical geography on which the settlement stands. The earliest advantages of a particular site are those thought to be important to early settlers. Anglo-Saxon farmers looked for good access to farmland, a water source and nearby woods (for fuel and construction).
- Important sites are **wet points** and **dry points**. A dry-point site is a higher, and therefore drier, location in an otherwise wet or marshy area. A wet-point site is a source of water where there is little surface drainage. **Spring-line settlements** develop where impervious rock (e.g. clay) meets pervious rock (e.g. limestone).

Form and function

- The **functions** of a settlement are its **economic** and **social** activities. The functions of most rural settlements were originally agriculture, mining or fishing. Over time their functions have changed. The main function of some rural settlements is tourism now. Many have developed into **commuter** or **dormitory** settlements.

SETTLEMENT PATTERNS (2)

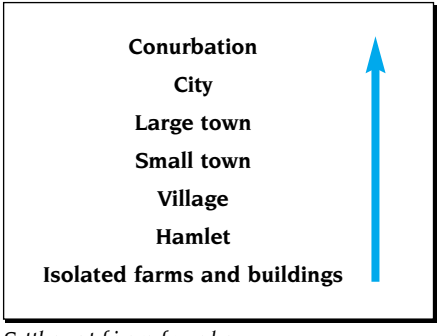


Factors influencing the sites and distribution of settlement

- The shape or **form** of a settlement refers to the plan outline of its built-up area. Settlements may be **linear (ribbon-like)**, **rectangular, circular** or **star-shaped**. Transport routes and flat land encourage growth in a particular direction in certain directions. Planning controls and flood-prone valleys may restrict development in certain directions. These positive and negative factors influence the shape of the settlement.
- It is possible to recognise the functions of settlements from Ordnance Survey (OS) maps. These functions include housing, industry, commerce, administration, recreation and transport.

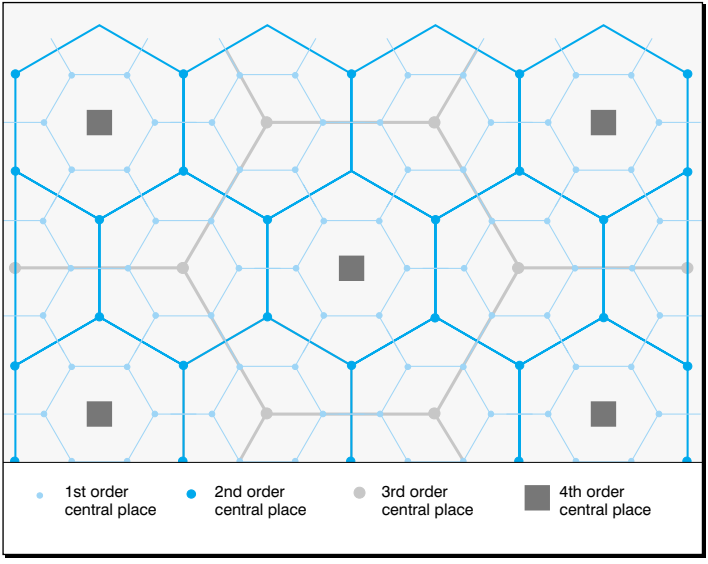
Settlement hierarchy

- Settlement patterns are largely determined by physical geography. A regular pattern of settlement would occur only on a flat, featureless plain where the population is evenly distributed. Human geographical factors can produce a regular settlement pattern so long as physical geography does not inhibit this. A settlement **hierarchy** tends to develop in an area. The hierarchy is ranked in order according to certain criteria. This is usually population size, but other factors, such as the number and types of shops and services, can also be used to order settlements.



Settlement hierarchy order

- The distribution of settlements can be explained in terms of **range, threshold** and **sphere of influence**. The range of a settlement is the maximum distance that a person is prepared to travel to use its services. The threshold represents the minimum area that a settlement can serve, if the shops and services are to remain profitable. The sphere of influence is the area served by the settlement. The arrangement of settlements based on these factors is explained by **central place theory**.



Settlement pattern according to central place theory

- **Convenience** or **low order** services are found at the bottom of the settlement hierarchy. People use these services regularly, so they are not prepared to travel very far for them. Convenience goods have a small sphere of influence and are found in many small rural settlements. In contrast, people buy **comparison goods** such as clothes and furniture less often. People are prepared to travel further to purchase these goods. Shops selling comparison goods have to serve a wider area in order to reach their threshold. The shops are found in **high order centres** such as towns and cities. They serve the population of the town in which they are located and people living in the surrounding area. There will be fewer higher order settlements and they will be further apart.

Settlement patterns (1–4)

1 Why is settlement dispersed in mountainous areas? (1)

2 What is the lowest bridging point of a river? (1)

3 'London is located at the lowest bridging point on the River Thames.' Does this describe London's site or situation? (1)

4 What kind of site is a settlement built on a river terrace? (1)

5 Why are some settlements sited on top of a hill? (1)

6 A shop becomes vacant in the centre of a village. Which of the following is likely to be the least successful: newsagent, jeweller, grocer? (1)

7 Why is a Marks and Spencer store unlikely to locate in a settlement with a population of less than 25,000? (1)

8 Why have many villages in the UK changed from their original function? (1)

9 What determines the minimum and the maximum size of a settlement's sphere of influence? (2)

10 State two reasons why villages have developed along spring lines. (2)

11 What changes will happen to a village if it becomes a dormitory settlement? (3)

12 Why is the settlement pattern in East Anglia likely to be the closest to the theoretical pattern suggested by central place theory? (2)

13 Why is there a greater range of shops and services in towns than in villages? (3)

SCORE

1 The agricultural land is poor so each farm needs a lot of land to be profitable. (1)

2 The first point upstream from the sea where it is narrow enough to build a bridge. (1) This is often the furthest point up the river that ocean-going ships can reach.

3 Situation. (1) The location is highly accessible from the surrounding regions, as all routes will tend to converge there.

4 Dry point (1) This is a very favourable site for settlement – close to water but not in danger of flooding.

5 For defensive reasons. (1) The inside of a river meander is another type of defensive site, e.g. Durham.

6 Jeweller. (1) There will not be enough customers in the village for the jeweller to reach its threshold.

7 Marks and Spencer is a high order store and needs a high population to remain profitable. (1)

8 Relatively few people depend on primary occupations such as farming, mining or quarrying now. (1)

9 The thresholds of the shops and services in the settlement determine the minimum size (1). The range determines the maximum size. (1) The shops and services have to serve enough customers to make a profit and these customers have to be within an acceptable travelling distance of the settlement.

10 The source of water (1) and the mixture of soils (1) are ideal for farming. The limestone soils are light and suitable for grazing whereas the heavier clay soils can be cultivated.

11 The village will get bigger because of house building. (1) The village shop may close because commuters shop in town. (1) The house prices will increase so the local population may no longer be able to buy homes. (1)

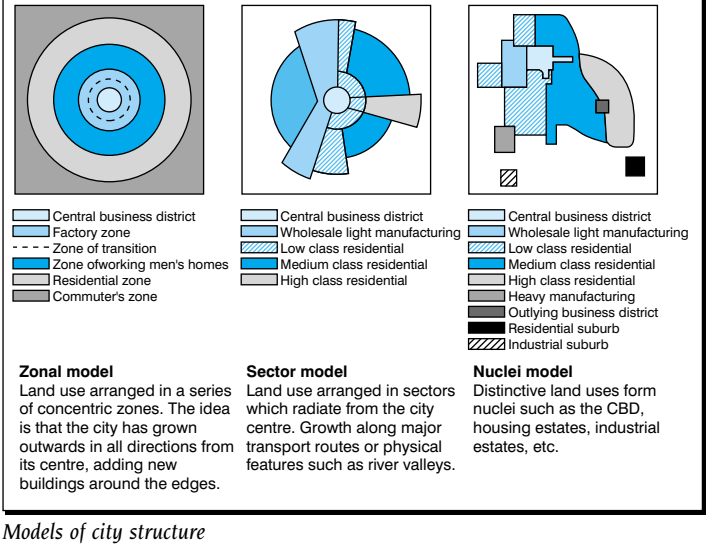
12 The relief is relatively flat and therefore good for settlement. (1) There are no major centres of heavy industry. (1)

13 A town serves a much larger population. (1) It serves both its own population and the population of surrounding villages (1). This allows both high and low order shops and services to develop. (1)

TOTAL

Urbanisation

- **Urban growth** is the increase in size of built-up areas in towns and cities. **Urbanisation** is the increase in the proportion of people living in towns and cities. Urbanisation is greatest in the LEDCs. This has led to the development of **millionaire** and **megacities**. In many LEDCs there is a **primate** pattern with one city many times larger than the second largest city. Urbanisation takes place as a result of **migration** and **natural increase. Counterurbanisation** has led to the decline of the largest cities in MEDCs.
- In many cities in MEDCs there are patterns in the land use, including **concentric circles** and **sectors**. In some cities there may be smaller, irregular shaped areas of land, each with its own distinctive land use.


Central business district
Factory zone
Zone of transition
Zone ofworking men's homes
Residential zone
Commuter's zone
Central business district
Wholesale light manufacturing
Low class residential
Medium class residential
High class residential
Central business district
Wholesale light manufacturing
Low class residential
Medium class residential
High class residential
Heavy manufacturing
Outlying business district
Residential suburb
Industrial suburb
Zonal model
Land use arranged in a series of concentric zones. The idea is that the city has grown outwards in all directions from its centre, adding new buildings around the edges.
Sector model
Land use arranged in sectors which radiate from the city centre. Growth along major transport routes or physical features such as river valleys.
Nuclei model
Distinctive land uses form nuclei such as the CBD, housing estates, industrial estates, etc.

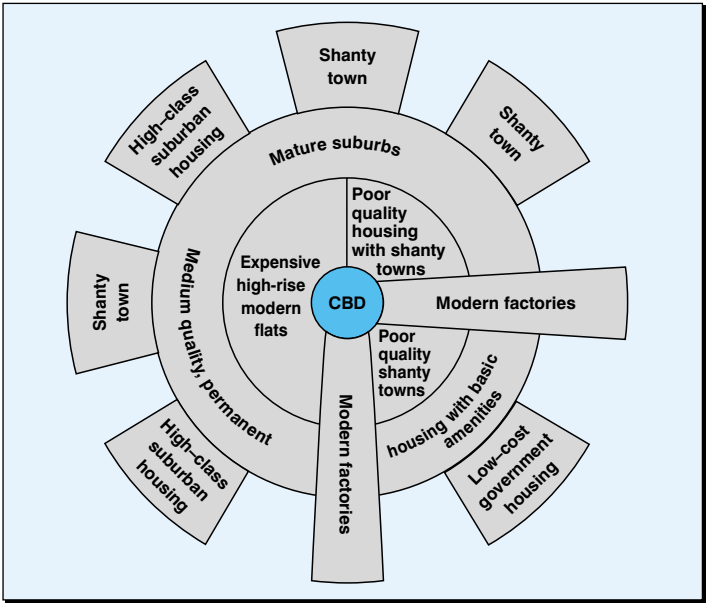
Models of city structure

Urban settlement in the UK

- The **Central Business District (CBD)** is the most accessible part of the city as it is the focus of routes. There is a intense competition for space, so land values are high resulting in many multi-storey buildings. Large shops and office blocks dominate these areas. The CBD is relatively small because people there are prepared to walk only short distances to shops. Very few people live in the CBD, as the land is too expensive for housing.
- The **inner city** consists of a **twilight zone**, which is in decline and contains industry, housing and derelict land. There are areas of **high-density housing** built in the nineteenth century when industry thrived in urban areas. The **suburbs** consist of low-density detached and semi-detached housing.
- Income, family status, ethnicity and the distribution of housing types affect where people live. Better-off families with children tend to live in the outer suburbs. Inner cities have a higher proportion of disadvantaged people. Ethnic **ghettos** have developed where immigrants have moved into the inner city.
- Inner city problems have proved very difficult to solve. In the 1950s people were moved out to **peripheral council estates** or to **New Towns** and **Expanded Towns**. High-rise flats were unsuccessful. Since the 1970s **urban renewal** projects have replaced **comprehensive redevelopment**. The housing in inner cities is being modernised and the environment improved. This allows people to remain in the inner city and retain their community spirit.
- In recent years there has been some migration of more well-off people into the inner city areas. This process of **gentrification** occurs because these people like to be near where they work and where entertainment takes place.

Urban areas in LEDCs

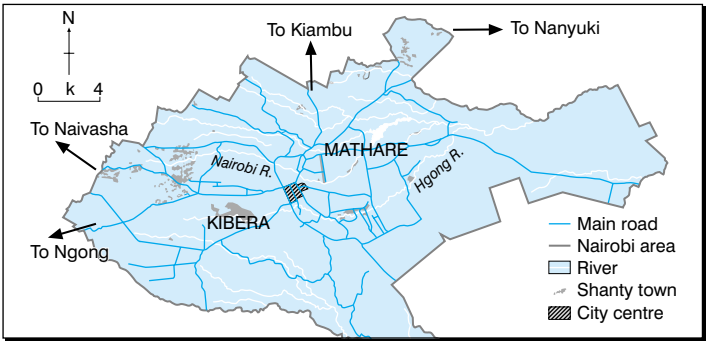
- Cities in LEDCs have a very different land use pattern to those in MEDCs. The CBD is dominated by modern administrative and commercial activities. Better-off people live in modern high-rise apartments around the CBD. Recently arrived migrants from the countryside live in derelict buildings and vacant plots of land close to the CBD where they look for work. The quality of the housing decreases with distance from the city centre. Commercial and industrial areas often follow the main roads and railways out from the city centre.



Model structure of a city in a LEDC

URBAN SETTLEMENT (4)

- The rapid growth of cities in LEDCs has produced illegal **shanty towns**. These are normally found around the edge of the city or on derelict land which is too steep for building or is prone to flooding. Initially the shanty houses are built with any available materials, such as sacking or corrugated iron. The absence of electricity and running water leads to a high incidence of disease. Inhabitants of shanty towns improve their homes as they become better off.
- Governments of LEDCs have tried hard to improve conditions in shanty towns. Cheap, purpose-built flats have been constructed in some cities, even though this encourages yet more people to migrate to the city. Some squatters in shanty towns are given legal status to encourage them to upgrade their homes.
- In '**site and service**' projects families are given a plot of land, served by roads, electricity and water, on which to build a home. Under a '**self-help scheme**' building materials are provided to improve temporary shacks.
- Increasingly it has been recognised that the best way to approach the shanty town problem is to improve conditions in the countryside. It is hoped that this will reduce urbanisation. Urban areas are growing so quickly that they are increasingly **unsustainable**.



Location of shanty towns in Nairobi

Urban settlement (1–4)

1 What is a 'millionaire' city? (1)

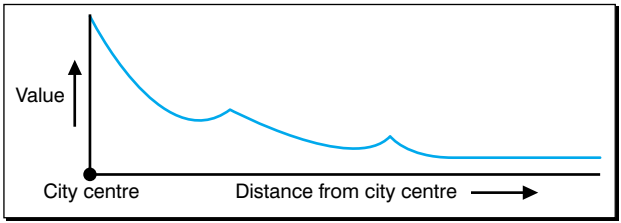
2 What is the disadvantage of a primate pattern of settlement? (1)

3 Why are there so many high-rise buildings in the CBD of a city? (1)

4 The accessibility of the CBD is no longer the advantage that it used to be. Explain why. (1)

5 What is a 'green belt'? (1)

6 The following is a graph showing how the value of land decreases from the city centre. Explain the variations in the shape of the graph. (4)



7 Give two reasons why high-rise housing was not considered to be a successful solution to inner city problems. (2)

8 How does the distribution of the poorest housing areas differ within cities in LEDCs and MEDCs? (2)

9 What is a 'ghetto'? (1)

10 What is 'comprehensive redevelopment'? (1)

11 Name a New Town. (1)

12 How do the locations of New Towns and Expanded Towns differ? (1)

13 Name two ways in which MEDCs have tackled urban traffic problems. (2)

14 How may gentrification affect the lives of people already living in the area? (1)

SCORE

1 A city with a million or more inhabitants. (1). The term 'million city' is sometimes used.
2 Most of the country's resources and investment go into its largest city. The rest of the country does not get its fair share. (1) The primate city is usually the capital.

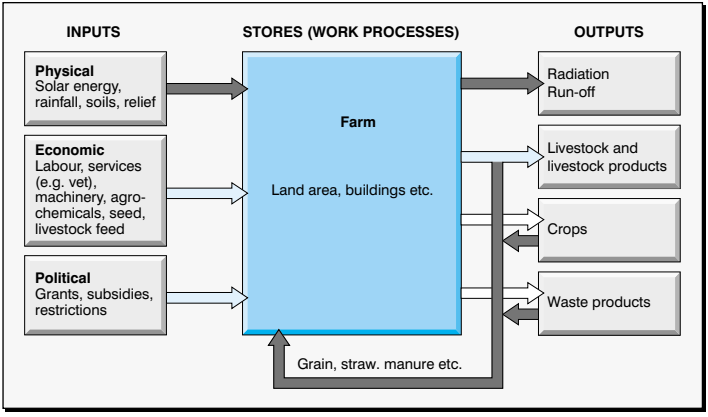
3 The cost of land is high so it is cheaper to build upwards. (1)
4 Land values are too high for many businesses to survive. (1) Many shops have moved to out-of-town sites.
5 An area of land around an urban centre where development is restricted. (1). Recreation, transport routes and other developments have increased pressure on the Green Belt.
6 There is a general decrease in land value with distance from the city centre. (1) There is a very rapid decrease within a short distance of the city centre. (1) Increased accessibility at road junctions leads to some increase in land values further out. (1) Beyond a certain point distance has little effect on land value. (1)
7 There was a loss of community spirit. (1). Many of the homes suffered badly from damp. (1)
8 In LEDCs the poorest people live on the edge of cities (1). The poorest housing in MEDCs is close to the city centre. (1)
9 An area where the population is dominated by people of one religious or ethnic group. (1). In geographical terms, this is not necessarily a disadvantaged area.
10 A solution to inner city problems that involves pulling down housing and moving people out. (1)

11 Stevenage (1).
12 New Towns are found closer to conurbations. (1) People from London have moved to Expanded Towns as far away as Bodmin, Cornwall.
13 Pedestrianisation. (1) Park and ride schemes. (1).
14 It increases the cost of housing. This can put houses beyond the budgets of local people. (1) Islington in London is an example of a gentrified area.

TOTAL

AGRICULTURE (1)

- **Agriculture** can be thought of as a **system** with **inputs**, **processes** and **outputs**. The system can range from an individual farm up to a regional, national or international scale.
- The inputs are **physical**, **economic** and **political**. Agricultural processes happen on a farm. The outputs are products such as crops and livestock. Government grants and subsidies are increasingly important in farming.



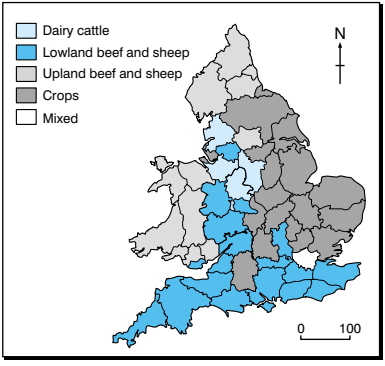
The farm system

Types of agriculture

- Farming can be classified as **commercial**, **subsistence**, **intensive**, and **extensive**.
- Subsistence farms produce sufficient outputs only for the farmer's family and unlike commercial farms they do not produce a surplus for sale. In intensive farming the yields are high because of high inputs of labour, capital or agro-chemicals. Extensive farming produces low output per area, even if output per worker is high. It is practised where land is plentiful and relatively cheap.

AGRICULTURE (2)

- **Pastoral** farming dominates the north and west of the British Isles. **Arable** farming is abundant in the south and east. This pattern reflects the difference in climate, relief and soils. In eastern and South-east England low precipitation and warm summers favour crops. The high precipitation in the west is ideal for grass growing, and hence cattle and sheep rearing.



Farming distribution in England and Wales, 1995

- **East Anglia** practises commercial arable farming producing wheat, sugar beet, potatoes and other vegetables. The summer temperatures of 15–20 °C encourage ripening. The precipitation is low enough to discourage fungal diseases and the summer maximum swells the crops ready for harvesting. The harsh winters break up the soil and kill pests.
- **Economies of scale** have produced **agribusinesses**. Farms have merged and field sizes have increased through the removal of hedges. **Agro-chemicals** are bought in bulk.
- **South-west England** practises dairy farming and market gardening. The North Atlantic Drift deters frosts. The growing season is long and crops are ready for market earlier than the rest of the UK.
- **Extensive sheep farming** is the most important form of agriculture in the uplands of Wales and Scotland. While many areas still depend on rough grazing, fertiliser use improves much of the pasture. Farming is heavily dependent on subsidies in these areas.

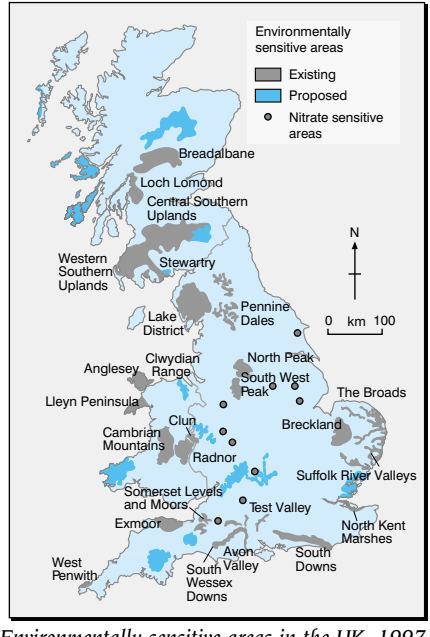
Types of agriculture (cont.)

- **Shifting agriculture** is the traditional farming method in tropical rainforests. It is a form of subsistence farming, often combined with hunting and gathering. Shifting cultivators avoid the problem of poor soils by making temporary forest clearings. Initially crop yields are good. However, cropping and heavy rainfall soon reduce soil fertility, so the farmers move on. Shifting agriculture is **sustainable** providing the population is not too high.
- In semi-arid areas **extensive nomadic herding** takes place. The quality of the grazing is poor, so animals are moved to new grazing lands following the seasonal rains. Lack of water and poor pasture mean a large area is needed to support each animal.
- **Intensive horticulture** is both labour and capital intensive. High-value crops such as fruit, vegetables and flowers are produced. There is a reliance on advanced technology and scientific research. **Cooperatives** provide growers with credit for materials and expensive machinery. They also help to process and market the products.
- Increasingly farming in Europe is dominated by the **Common Agricultural Policy (CAP)**. The success of farming depends as much on CAP as on environmental factors. CAP aims to provide farmers with a guaranteed income. Surplus produce is bought up when prices do not reach a minimum target price. Farming in marginal areas receives grants and subsidies. Money is also available for modernisation, **diversification** and **conservation**. Farmers are paid to '**set-aside**' land to reduce overproduction

Environmental issues

- Increased food production has harmed the environment. Hedgerow removal causes wind erosion. Overuse of agro-chemicals has led to **eutrophication** and contamination of water courses. **Biodiversity** has been reduced too.

- In recent years EU policies have tried to balance the needs of farmers with those of conservationists. **Incentives** have been given for replacing hedgerows and woodland.
- The **Green Revolution** is responsible for agricultural change in LEDCs. **High yielding varieties (HYVs)** of crops have increased food production. However, HYVs require expensive irrigation and fertilisers. Farmers need credit if they are to benefit from the Green Revolution.



Environmentally sensitive areas in the UK, 1997

- Rapid population growth in LEDCs has lead to overuse of land. **Overgrazing** and **overcultivation** produces **soil erosion**, **salinisation** and **deforestation**. The destruction of vegetation exposes soil to wind erosion. **Contour ploughing**, **cover crops**, **windbreaks** and **crop rotation** help to conserve soil.

Agriculture (1–4)

1 What is crofting? (1)

2 How can an output become an input in a farming system? (1)

3 Why is 'slash and burn' an appropriate alternative name for shifting agriculture? (1)

4 What are 'economies of scale'? (1)

5 How can the removal of hedgerows increase the danger of soil erosion? (1)

6 What is diversification? (1)

7 What is the effect of eutrophication? (1)

8 What is a quota? (1)

9 How can contour ploughing reduce the danger of soil erosion? (1)

10 What is sustainable agriculture? (1)

11 Name three ways in which an agricultural ecosystem differs from a natural ecosystem. (3)

12 Why can plantation farming be described as a commercial intensive agricultural system? (2)

13 State an advantage and a disadvantage of organic farming (2)

14 Draw a system diagram to show the main features of an extensive ranching system. (3)

SCORE

1 A family run hill farm in the Scottish Highlands. (1)
These survive by government subsidies.

2 Manure and crop waste are good fertilisers. (1)
On commercial farms profits can be reinvested.

3 Clearings are made in the rainforest by cutting down and burning vegetation. (1).

4 Buying and selling in bulk. (1)
This increases a farm's profits by reducing costs.

5 It removes shelter and exposes greater areas to erosion. (1)
This is a particular problem in East Anglia.

6 Where a farm develops other sources of income outside of its agricultural practices. (1) For example, tourist facilities.

7 Ground water supplies become contaminated (1). Algae and bacteria grow, reducing oxygen levels and killing fish.

8 The amount of milk a dairy farmer is allowed to produce. (1)
Quotas were introduced to reduce overproduction when people changed from dairy to vegetable oil products.

9 Ploughing across slopes slows surface run-off. (1)

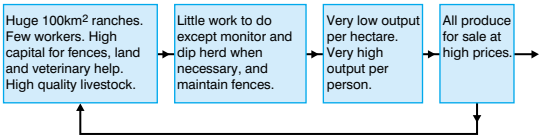
10 Agriculture which does not destroy the environment (1)
Sustainability ensures resources are left for the next generation.

11 An agricultural ecosystem concentrates on a few plants and animals, so there is less biodiversity. (1) It is not sustainable because most outputs are removed from the ecosystem and are not recycled. (1) There are fewer trophic layers. (1)

12 The products are for sale. (1) Labour and capital inputs are high. (1)

13 Organic food is less likely to be harmful to humans because agro-chemicals are not used. (1) It is expensive to produce because outputs are lower. (1)

14


Huge 100km² ranches. Few workers. High capital for fences, land and veterinary help. High quality livestock.
Little work to do except monitor and dip herd when necessary, and maintain fences.
Very low output per hectare. Very high output per person.
All produce for sale at high prices.

(3)

TOTAL

Types of industry

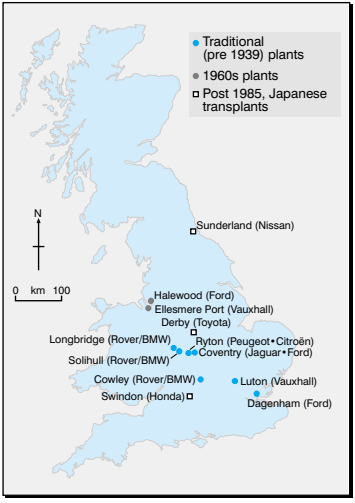
- **Economic activities** can be divided into groups. **Primary activities** are **extraction** industries, which produce food and raw materials. **Secondary** industries are manufacturing industries, which make **added value** products, e.g. by refining raw materials; processing materials; or assembling components. **Tertiary** activities are services. **Quaternary** service industries involve high-level decision making.
- As a country develops the percentage of people employed in manufacturing increases. In the most developed economies tertiary and quaternary activities are replacing manufacturing industries. Until the late 1990s the most rapid **industrialisation** was in the **Newly Industrialising Countries (NICs)** of South-east Asia.

Factors affecting location

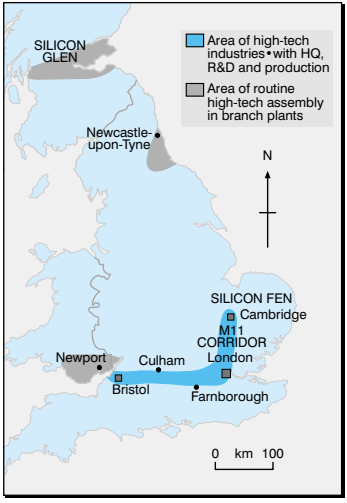
- Heavy basic industries have definite site and locational requirements. Modern, lighter industries are **footloose**. New industrial sites are called **greenfield** sites. A **brownfield** site is where a new industry locates on a redeveloped industrial site. **Industrial inertia** can affect industrial location.
- Traditionally, iron and steel industries were located close to sources of energy or raw materials. Modern iron and steel works rely on imported coal and iron ore, so they have coastal locations. There is no longer bulk storage of coal, iron and limestone at these sites. A continuous supply of raw materials is brought to the site.
- **Car manufacturing** is an **assembly** industry. **Components** such as engines and body parts are assembled together. Transnational companies (TNCs) operate globally and dominate the car industry. The headquarters of TNCs are usually in a MEDC but the TNC can have factories all over the world. Since 1984 Japanese car companies have invested heavily in the UK. The location of Japanese car plants has been affected heavily by the **government location policy** in the UK. The policy encourages industry in areas of high unemployment.

INDUSTRY (2)

- **High-tech** industries are footloose, but most are found close to universities. Universities offer a highly skilled workforce including scientists, technicians and managers, and are centres of research and development. Access to airports is important too, as high-tech industries are global. Easy access to banks and other financial institutions is necessary for raising investment.



Major UK car assembly plants, 1997

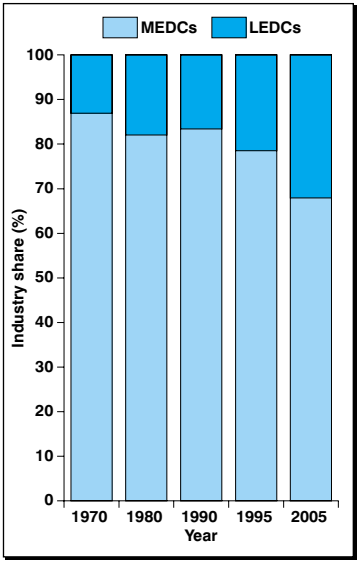


Major concentrations of high-tech industry in the UK, 1997

- Government location policies are often more important than economic location factors now. Governments can have direct influence if the industry is state owned. The influence of the government is more indirect with privately owned industries.

Globalisation

- Increasingly, manufacturing industry is organised on a global scale. One effect has been the rapid growth in LEDCs. **Globalisation** has occurred because TNCs can employ people, make products and buy services cheaply in LEDCs, as well as gaining access to worldwide markets. Globalisation allows economies of scale too. Foreign investors in the UK get around EU trade barriers.
- The distribution of manufacturing industry across the world has changed. The nature of industry in traditional coalfield locations is different too. Government location policy and globalisation have produced these changes.
- The main aim of government location policy is to reduce the effects of regional unemployment and its associated social problems.
- Most governments have used a 'carrot and stick' approach. Financial incentives such as subsidies and grants are given, and planning restrictions are used to discourage industry from locating in particular areas.
- Foreign investment has been a major feature of recent industrial location. The NICs of South-east Asia have invested heavily overseas. Economic growth in these countries was based on low wages, use of subsidies and cheap loans.

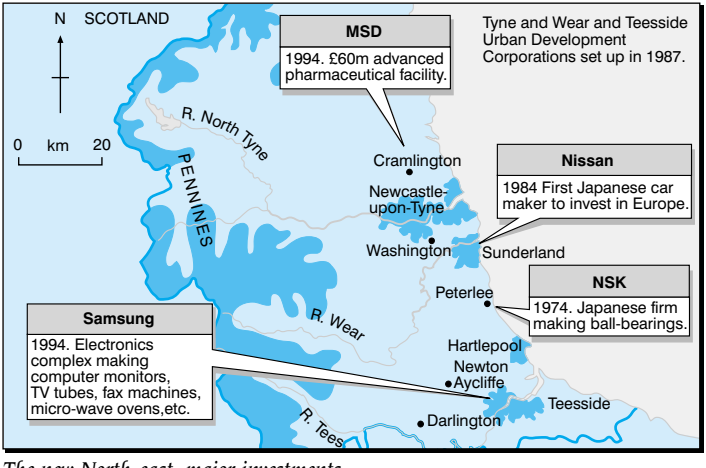


Changing structure of global manufacturing, 1970–2005

- Large South Korean companies have invested in the UK partly because of UK government grants. High-tech industry has replaced many heavier industries.

Reindustrialisation

- North-east England, following the collapse of traditional **smokestack** industries has gone through a period of **reindustrialisation**. The region's skilled labour force, low labour costs, good communications and regional assistance has attracted many companies.



The new North-east: major investments.

- The decline in UK manufacturing industry has left large areas of **derelict land**. Various attempts have been made to overcome this problem. For example, redevelopment of brownfield sites with the use of private investment. **Urban development corporations** have redeveloped docklands by building offices and leisure facilities. **Enterprise zones** give special tax allowances and fewer, simplified planning procedures.

Industry (1–4)

1 What is 'industrial inertia'? (1)

2 What is a development area? (1)

3 Name a NIC that has invested in the UK. (1)

4 To what group of industries does advertising belong? (1)

5 What is an integrated steelworks? (1)

6 Name a modern integrated steelworks in the UK. (1)

7 Why is the Midlands the traditional area for the car industry? (1)

8 What is an industrial estate? (1)

9 Why is a cannery more likely to be found near the raw material than the market? (1)

10 What is agglomeration? (1)

11 Draw an industrial system of a manufacturing industry. (3)

12 Why is there a link between secondary and tertiary industries? (2)

13 Give three reasons for the development of high-tech industries in Cambridge. (3)

14 Name two disadvantages which coalfield industrial areas face when they try to attract new industrial growth. (2)

SCORE

1 Where an industry remains at a location even though the original advantages of the site are no longer applicable. (1) Also called historical momentum or geographical inertia.

2 Area of industrial decline that is eligible for government assistance. (1) Examples are South Wales and North-east England

3 Daewoo, Honda, Samsung. (1)

4 Quaternary. (1) This service industry is dependent on high-quality decisions and makes frequent use of computers.

5 Where all the operations are on the same site. (1)

6 Llanwern, Port Talbot, Scunthorpe, Redcar-Lackenby (1)

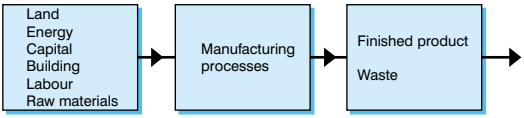
7 Its central location made the assembly of components relatively easy. (1) Inertia is also important.

8 An area of footloose light industries which benefit from good road access. (1) Often found on outskirts of urban areas.

9 The finished product is less perishable than the raw material. (1) Bakeries are the opposite. The finished product (bread) is more perishable than the raw material.

10 Industries locating close together for mutual benefit. (1) Benefits include sharing each other's products or research and development.

11



(3)

12 The service industry sells or distributes the products of the secondary industry. (1) Service industries make use of manufactured products. (1)

13 Nearness to Cambridge University research and development. (1) M11 links to London. (1) Attractive area. (1)

14 Labour force needs retraining. (1) Remoteness or poor access. (1) Distance from the main core regions of South-east England and the Continent.

TOTAL

TOURISM (1)

- **Tourism** is leisure time that involves visiting places and staying away from home for at least one night. It is one of the world's fastest growing industries employing 120 million people. Tourism develops in **mountains, coastal areas and cities**. The physical attractions of mountains and coasts attract visitors. People visit cities because of their historical and cultural heritage, and for shopping and entertainment.
- Tourism has developed because of increased leisure time. People have longer, paid holidays today. Increased car ownership and the development of charter flights have made places more accessible.

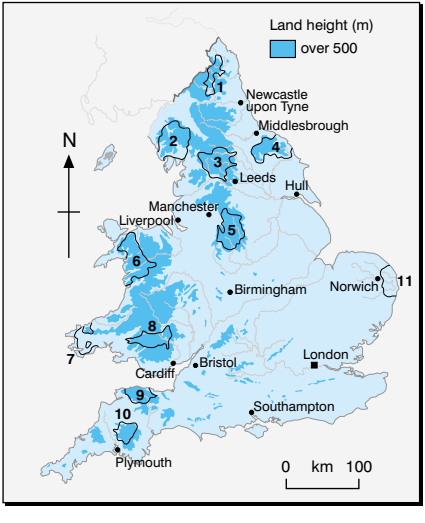
UK tourist industry

- Tourism first developed in the UK during the second half of the nineteenth century. The introduction of paid holidays, cheap railway travel and effective advertising of the health benefits of sea air encouraged tourism.
- Blackpool's tourism industry took off with the introduction of a railway link to the rapidly growing industrial cities of the North. More recently, the uncertainty of British weather has caused a decline in British seaside resorts. Blackpool continues to attract tourists by providing new entertainment facilities which are less dependent on the weather.
- The development of **package holidays** benefited foreign holidays because travel companies make all the necessary travel and accommodation arrangements. Economies of scale has meant cheaper holidays for customers.
- The USA and the Caribbean are as popular as Mediterranean Europe for holidaymakers. These destinations have made package tourism a year-round industry.
- In a few years' time tourism will be the UK's biggest industry. It is an important source of income. Over 23 million foreign visitors come to the UK each year spending £12,000 million.

- Tourism has its disadvantages. It remains largely seasonal and much of the employment it generates is in low paid, unskilled jobs. Tourist destinations can become unfashionable. Tourism causes pollution and traffic congestion at **honeypot** sites.

National Parks

- **National Parks** are areas of great natural beauty that are protected in order to save the environment and to provide enjoyment to visitors. National Parks in the USA are large areas of wilderness owned by the government. In the UK National Parks are smaller and contain a range of economic activities, as well as tourism. Much of the land is privately owned and there are many permanent settlements.
- There is great potential for conflict in National Parks. Problems include traffic congestion, footpath erosion and noise pollution from speedboats on lakes.



1 Northumberland
2 Lake District
3 Yorkshire Dales
4 North York Moors
5 Peak District
6 Snowdonia
7 Pembrokeshire Coast
8 Brecon Beacons
9 Exmoor
10 Dartmoor
11 Norfolk Broads Authority

Distribution of National Parks in England and Wales

Tourism in LEDCs

- Although LEDCs account for only 20% of world tourism this proportion is growing rapidly. Tourism is the fastest growing industry in Africa. LEDCs view tourism as a means of development. The tropical nature of many LEDCs makes them very attractive to visitors from MEDCs.
- In many LEDCs tourists are an important source of income. Not only do tourists spend money, but they also attract foreign investment as the country's infrastructure is improved. The tourist industry creates jobs too. There is also a **multiplier effect** with the growth of indirect employment, e.g. farmers provide food for hotels.
- Tourism also has disadvantages to LEDCs. Improving infrastructure is expensive, so it is often dependent on foreign investment. Much of the profits therefore do not remain in the LEDC. Development tends to be concentrated in holiday areas and can create a **dual economy**.

Environmental issues

- **Mass tourism** may change local culture and traditions. It also puts enormous pressure on the environment, e.g. pollution. Ugly buildings and resorts may replace vegetation.
- In Kenya large areas of land have been designated as **game parks** to protect wild animals from the effects of mass tourism. Minibuses carrying tourists have worn away tracks, encouraging soil erosion. The high concentration of visitors and hot air balloon trips have disturbed the breeding patterns and migration routes of some animals. Local farmers have been displaced from their own land.
- **Green tourism** is sustainable. Zimbabwe has similar attractions to Kenya, but it has developed its tourist industry very differently. Zimbabwe encourages **eco-tourists**, usually in small groups visiting on special interest holidays. These include wildlife enthusiasts, bird watchers, botanists and photographers.

- Game parks have been established but there is support from local people. The CAMPFIRE programme educates local people to regard wild animals as a 'resource'. Only a limited number of wild animals can be hunted for sport, and the proceeds go to the local population. Local communities receive money for any crop damage caused by wild animals.

Major tourism attractions in Zimbabwe

Tourism (1–4)

1 Why have transport improvements been important in the development of mass tourism? (1)

2 Name one way British seaside resorts are attempting to cope with the competition from foreign holiday resorts. (1)

3 What is the 'multiplier effect' in the tourist industry? (1)

4 Name a National Park in Wales. (1)

5 How does the Broads Authority differ from other National Parks in England and Wales? (1)

6 How does land ownership in a North American National Park differ from that in a UK National Park? (1)

7 What is a 'honeypot' site? (1)

8 Why is the seasonal nature of tourism a disadvantage? (1)

9 Why are unskilled tourist workers particularly vulnerable when there is a downturn in industry? (1)

10 What is sustainable tourism? (1)

11 How will the development of a town into a seaside resort be reflected in its shape? (2)

12 Name three sources of conflict between tourists and local people within a tourist area. (3)

13 Name three ways in which land use conflict can be minimised within a tourist area. (3)

14 How can the development of tourism in a mountainous area damage the environment? (2)

SCORE

1 Greater accessibility. (1) Longer, paid holidays have also been a factor.
2 By investing in new entertainments. (1) For example, indoor activities. Hotels provide special deals too.
3 Where developments in tourism lead to growth in separate but related trades. (1) For example, the building trade.
4 Snowdonia, Brecon Beacons or Pembrokeshire Coastal Park. (1)

5 It is the only park in lowland England. (1)

6 In the US the government owns all the land. (1)
7 A tourist area which attracts a large number of visitors. (1) This may cause traffic and pollution problems.

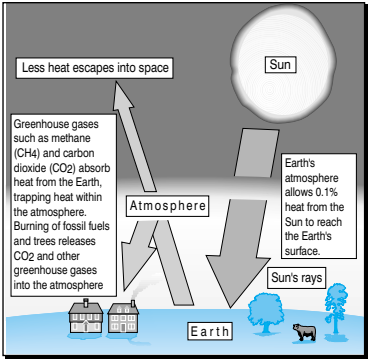
8 It creates seasonal unemployment. (1)
9 Workers such as waiters and chambermaids are more likely to lose their jobs out of season. (1) Managers and other skilled workers are often kept on.
10 The careful management of resources so that the impact of tourism does not harm the environment. (1) Features that attract visitors are protected, e.g. coral.
11 There will be a promenade along the sea front (1) and a series of terrace boarding houses running inland from the sea. (1)
12 Gates left open to fields. (1) Traffic congestion. (1) Reafforestation is less attractive to visitors. (1) A useful technique is to draw conflict matrix.
13 Limiting parking space or providing park and ride schemes. (1) Dividing water storage and water sports activities between different lakes. (1) Speed restrictions on powerboats to reduce erosion of banks. (1) Management plans aim to minimise conflict.
14 Hill walking and climbing erodes footpaths, leaving unsightly scars. (1) Cable cars and ski lifts spoil the landscape. (1)

TOTAL

- **Natural resources** are naturally occurring things that are useful to us. They include fuels, minerals and timber. **Non-renewable** resources are fossil fuels such as coal and oil. **Renewable** resources include plants and animals, water and alternative sources of energy.

Global warming

- Average global temperatures have risen by 0.6°C during the last 40 years. Some scientists say that **global warming** will raise average temperatures by 3°C. Global warming is caused by the **greenhouse effect**.
- There is debate over whether global warming is a natural event or is caused by human activity. There is increasing evidence that the burning of fossil fuels has had a major effect.

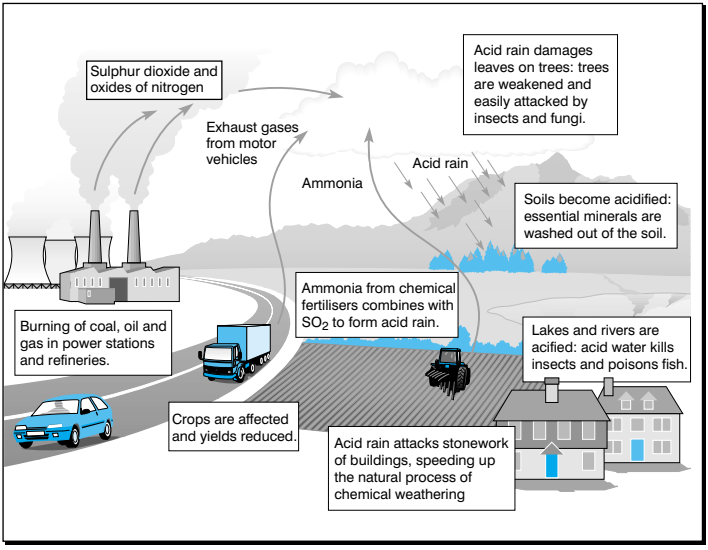

Less heat escapes into space
Sun
Greenhouse gases such as methane (CH_4) and carbon dioxide (CO_2) absorb heat from the Earth, trapping heat within the atmosphere. Burning of fossil fuels and trees releases CO_2 and other greenhouse gases into the atmosphere
Atmosphere
Earth's atmosphere allows 0.1% heat from the Sun to reach the Earth's surface.
Sun's rays
Earth

The greenhouse effect

- **Global warming** has both advantages and disadvantages. Britain will be able to grow a greater range of crops. Warmer weather may help the tourist industry. However, there will be increased danger of coastal flooding, water shortages, pests and disease. Globally, the melting of the polar ice caps will cause many low-lying areas to flood. Droughts, storms and floods will become more frequent.
- At the 1992 Earth Summit in Brazil there was a general agreement to reduce the amount of fossil fuels burnt. Rapid industrialisation in NICs, the economic interests of TNCs, and the reluctance of the USA to reduce its living standard means progress has been very slow.

Pollutants

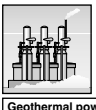
- CFCs are **destroying the ozone layer** that protects us from the sun's harmful ultraviolet radiation (UVB rays). Large doses of UVB cause skin cancer, eye cataracts, crop damage and harm to plankton. There is international agreement to reduce the production of CFCs. The reduction will take a very long time to take effect.
- Power stations and oil refineries release sulphur dioxide and nitrogen oxides into the atmosphere. These gases react with water in the atmosphere to produce **acid rain**. Forests, soils, lakes, rivers and buildings in Scandinavia have been badly affected by acid rain produced in the UK and Germany. International cooperation is required to reduce this effect.


Sulphur dioxide and oxides of nitrogen
Exhaust gases from motor vehicles
Ammonia
Acid rain
Acid rain damages leaves on trees: trees are weakened and easily attacked by insects and fungi.
Soils become acidified: essential minerals are washed out of the soil.
Ammonia from chemical fertilisers combines with SO_2 to form acid rain.
Burning of coal, oil and gas in power stations and refineries.
Lakes and rivers are acified: acid water kills insects and poisons fish.
Crops are affected and yields reduced.
Acid rain attacks stonework of buildings, speeding up the natural process of chemical weathering

Acid rain: causes and effects

Conserving energy resources

- The need to satisfy the increasing demand for energy and water is the primary concern in resource management. Increasing population and the rapid development of technology means that this problem will continue in future. **Conservation** and **sustainability** will be major considerations.
- In future, fossil fuels will still be needed to produce energy. In the UK there has been a large reduction in underground coal mining. **Open-cast mining** is still important because it is cheaper than deep mining. It also provides jobs in areas of high unemployment. However, it is environmentally destructive. Landscaping can reduce this effect.
- **Nuclear power** requires very little raw material and does not produce greenhouse gases or **acid rain**. It has become increasingly unpopular because of safety issues. The Chernobyl disaster and concerns about the Sellafield plant in the UK have affected public opinion greatly. Unlike the UK, France still regards nuclear power as an important source of energy.
- Alternative or renewable sources of energy such as wind, tidal, solar, hydro and geothermal power may be the way forward. These too have advantages and disadvantages.

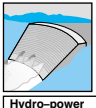


Geothermal power
Feasible where hot rocks, because of volcanic activity, lie close to the surface.

Wave power
There is great potential on the UK's stormy western coastlines. Small wave machines are already working well in Norway.

Tidal power
The UK with its large tidal range, could produce huge amounts of electricity from barrages across estuaries. Disadvantages include the high capital costs.

Solar power
Solar power can be used to heat water directly for domestic heating; to make steam to generate electricity; to generate electricity directly using photo-voltaic cells.

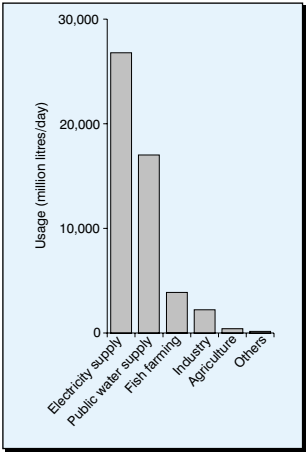


Hydro–power
Hydroelectric power (HEP) already provides nearly 2 per cent of the UK's electricity. There are significant environmental costs, particularly where dams are built and valleys are flooded.

Forms of renewable energy

Water resources

- At present, the global demand for water doubles every 25 years. Reasons are world population growth, increasing use of irrigation and increased consumption per person. This demand is unsustainable.
- Just 5% of the rain falling in the UK is used. In recent years water shortages have become common. Global warming may be responsible for these droughts. Most of the rain falls in the north and west of the UK. The largest demand is in the south and east. Rainfall is highest in winter but the greatest demand for water is in the summer.
- Satisfying water demand is not easy. As well as maintaining supply, water companies have to ensure supplies are sustainable and do not damage the environment. They can increase water reserves by building more reservoirs. Water can be transferred from areas of plenty to areas of shortage. **Conservation** measures include plugging leaks and metering water usage.
- Arid and semi-arid countries require large-scale solutions to water shortage. These are expensive so LEDCs have to find money to fund the schemes. Water provision may be part of a **multi-purpose scheme**. The Aswan Dam in Egypt provides water for irrigation, domestic water supply, and hydroelectricity.
- Demand for water can cause political disputes between countries. This can lead to war as in the case of India and Pakistan.



Water use in the UK

Managing natural resources (1–4)

1 What is the greenhouse effect? (1)

2 Name a greenhouse gas. (1)

3 State one effect of global warming. (1)

4 Why is Bangladesh particularly concerned about the effects of global warming? (1)

5 Name one effect of the hole in the ozone layer. (1)

6 How can acid rain affect buildings? (1)

7 Selby is the main British coalfield still mining coal underground. Where is Selby? (1)

8 What is the raw material used to produce nuclear energy? (1)

9 What is an aquifier? (1)

10 What is the disadvantage of taking more water from underground? (1)

11 Why does London get much of its water from underground? (2)

12 State three reasons why coal, despite being a polluting fossil fuel continues to be mined in the UK. (3)

13 Why is Scandinavia particularly prone to the effects of acid rain? (2)

14 What are the causes of the thinning ozone layer? (3)

SCORE

1 Greenhouse gases trap heat within the atmosphere. (1)

2 Methane or carbon dioxide. (1).

3 Melting of polar icecaps and a rise in sea level. (1)
4 It is a very low-lying country on the Ganges delta, so it will flood if sea level rises significantly. (1) Global warming has increased the scale and frequency of tropical storms.
5 Skin cancer, cataracts; harm to crops and plankton. (1)
6 It attacks stonework speeding up the natural process of chemical weathering. (1) Common in limestone buildings.

7 Yorkshire. (1).

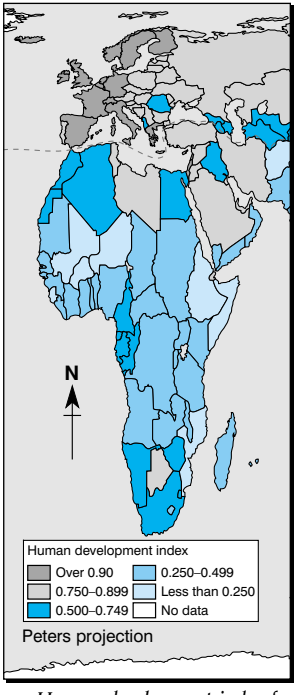
8 Uranium. (1) Uranium is non-renewable but so little is used that supplies are effectively infinite.
9 Porous rock which contains a source of water. (1) This is where water from boreholes comes from.
10 Water table drops and river levels fall. (1) This looks unsightly and affects wildlife.
11 The rainfall in South-east England is relatively low. (1) The London basin is a downfold of chalk. The chalk is porous and forms a water-bearing aquifer. (1)
12 There are large supplies left, which are economic to mine by open-cast methods. (1) Many coal fired power stations remain. (1) Closing mines would cause unemployment. (1)
13 Norway and Sweden lie relatively close to the industrial areas of the UK and Germany. (1) The prevailing winds from the west blow pollutants across to Scandinavia. (1)
14 Ozone is concentrated between 20-30 km above the earth's surface. (1) CFCs accumulate in the atmosphere. (1) The CFCs contain chlorine which reacts with sunlight to destroy ozone. (1) Make sure you know the difference between global warming, ozone depletion and the greenhouse effect.

TOTAL

- **Development** is the extent to which a country, region or locality has realised the full potential of its human and physical resources. Development can reduce poverty and improve quality of life. **Economic development** is the expansion of agricultural, manufacturing or service industries. **Social development** is about providing people with essential services such as education and healthcare.

Measures of development

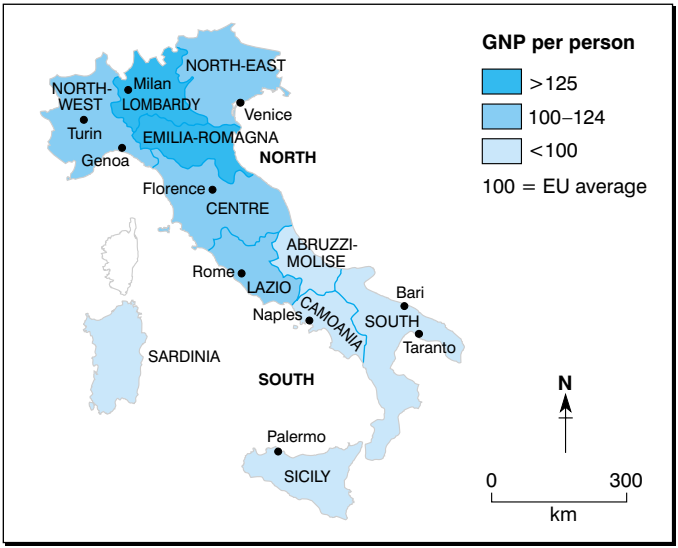
- There are a number of ways of measuring development. Measures are average figures only and do not take account of internal variations. **Gross national product (GNP)** per person is the most common measure. It is the total value of goods and services produced by a country divided by its population. GNP does not take into consideration the purchasing power of people's money or any **subsistence economy**.
- Other development measures include **adult literacy rates, birth and death rates, daily calorie intake per person, percentage employed in agriculture, and percentage receiving secondary education**. In all cases the measure is expressed as a rate or per head. The UN uses a combination of measures in the **Human Development Index (HDI)**. This ranges from zero to one; one being the most highly developed countries.



Human development index for Europe and Africa, 1993

CONTRASTS IN DEVELOPMENT (2)

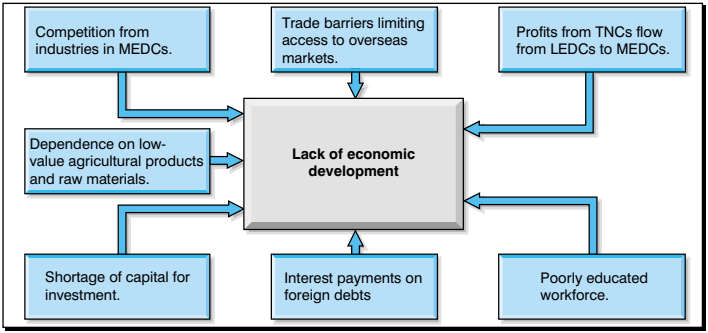
- The global distribution of wealth is very uneven. With the exception of Australia and New Zealand all MEDCs are in the temperate zone of the northern hemisphere. LEDCs are concentrated in the Tropics and the southern hemisphere. It is possible to divide the world into the rich 'North' and the poor 'South'.
- Contrasts in development are very marked within countries. **Core** areas tend to concentrate on manufacturing industry and services. This creates jobs and attracts investment – the '**multiplier effect**'. Remoteness, physical disadvantages of relief and climate, and greater reliance on agriculture are features of poorer, **peripheral** regions. These regions do not attract investment and this can lead to out-migration. Differences between core areas and the periphery tend to increase.



Regional GNP per person in Italy, 1996

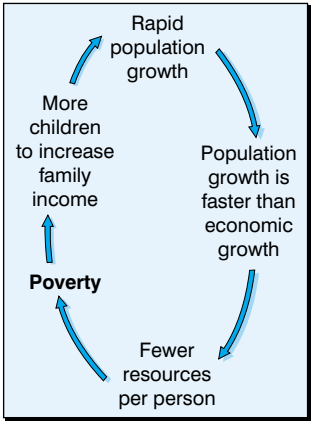
Obstacles to development

- Globally, the contrast between the rich North and poor South is getting wider. The majority of the world's countries is still under developed. The **obstacles to development** are both human and physical.
- Landlocked countries are isolated from international trade. Tropical soils are shallow and acidic. **Laterisation** leads to the build up of iron salts in the surface layers making them difficult to cultivate. **Low precipitation** and its seasonal nature make farming difficult. **Dense rainforest** hinders development in equatorial regions.
- **Pests and disease** affect the health of people living in LEDCs. The tropical climate and poor living conditions favour the spread of malaria and sleeping sickness - both diseases are carried by mosquitoes and tsetse flies. In LEDCs most people cannot afford essential medicines. Pests destroy up to half of the world's food crops. Poor food results in **famine**, **malnutrition** and **disease**. Lack of education is responsible for the rapid spread of HIV and AIDS in many LEDCs.
- About two billion people have no access to clean water. Polluted streams and pools encourage water-borne diseases, e.g. diarrhoea.


Competition from industries in MEDCs.
Trade barriers limiting access to overseas markets.
Profits from TNCs flow from LEDCs to MEDCs.
Dependence on low-value agricultural products and raw materials.
Lack of economic development
Shortage of capital for investment.
Interest payments on foreign debts
Poorly educated workforce.

Economic obstacles to development

- **Lack of investment** (capital) has hindered development in many LEDCs.
- LEDCs trade mainly **primary products** such as food and raw materials. These are less profitable than manufactured goods. The price for primary products can fall sharply. Generally, prices have fallen behind those of manufactured goods.
- **Political instability** and corruption in many LEDCs means that money is not spent effectively. Civil war can disrupt the local economy and discourage foreign investment.
- Women have lower status than men in many LEDCs. Female literacy is much lower than males because of poor education for girls.
- All problems faced by LEDCs are made worse by their **rapid population growth**. Population growth exceeds economic growth resulting in a **viscous cycle of poverty**.


Rapid population growth
Population growth is faster than economic growth
Fewer resources per person
Poverty
More children to increase family income

Vicious cycle of poverty

- **Tourism** and **industrialisation** have been the main focus of **economic development** in LEDCs. **Social development** has taken place in Kerala, India. Here, priority was given to education, family planning and heathcare. Despite being one of India's poorest states Kerala's development compares favourably with the rest of India.

	India	Kerala
Female life expectancy	60	75
Infant mortality per 1,000	80	17
Birth rate per female	3.6	1.8
Percentage female literacy	39	86

Contrasts in development (1–4)

1 Why are measures of development expressed as rates per 100 or per head? (1)

2 What is infant mortality? (1)

3 What is GNP? (1)

4 Why is population not a good measure of development? (1)

5 What pest spreads malaria? (1)

6 How will an improvement in female literacy affect population growth? (1)

7 What is the Brandt Line? (1)

8 Why is the improvement in water supplies considered to be the most important way of helping poorer parts of the world? (1)

9 Why is the 'debt' crisis considered a barrier to development in LEDCs? (1)

10 What is the difference between famine and malnutrition? (2)

11 Name three features of a balanced diet. (3)

12 What will happen to the viscous cycle of poverty if LEDCs manage to control population growth? (4)

13 The GNP for Saudi Arabia is 6,945 US dollars per head. Why is this not a true picture of development in Saudi Arabia? (2)

SCORE

1 Allows comparison of like with like. (1)

2 The number of children who die before their first birthday. (1) Child mortality is the number who die before they are 5.

3 Gross National Product. (1) This geographical term can be expressed as an abbreviation.

4 Countries with a large population are not necessarily richer or poorer than countries with a small population. (1) The economic means to support the population is more important.

5 Mosquito. (1)

6 It will reduce population growth. Literate women are more likely to understand the benefits of family planning. (1) Educated women are more likely to postpone having children in order to pursue a career.

7 The line separating the rich 'North' from the poor 'South'. (1)

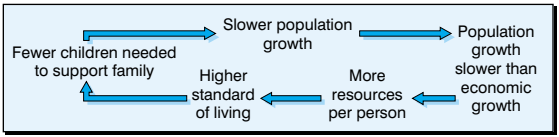
8 It can be done relatively cheaply and it quickly improves health. (1) Small water pumps are good examples of intermediate or appropriate technology.

9 Much of an LEDC's resources are used to pay interest on debts. (1) This means there is less money to spend on improvements.

10 Famine is lack of food. (1) Eating an unbalanced diet causes malnutrition. (1)

11 Diet containing protein (1), fats (1) and carbohydrates. (1) Many LEDC diets are dominated by carbohydrates.

12


Slower population growth
Population growth slower than economic growth
More resources per person
Higher standard of living
Fewer children needed to support family

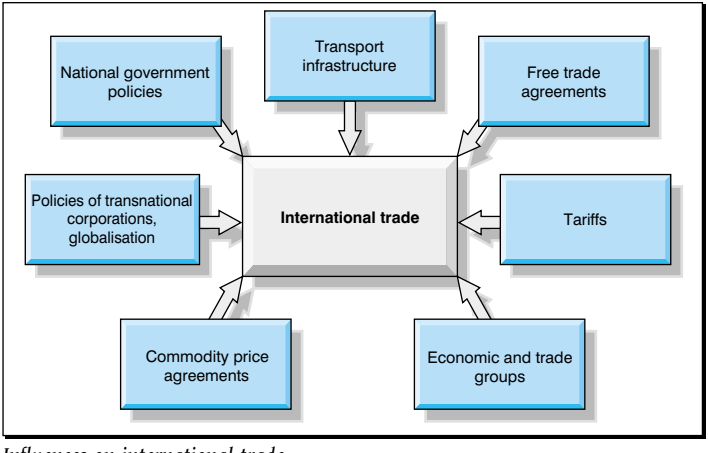
(4)

13 It is an average figure. (1) It does not show the difference between rich and poor. (1) Average figures do not show the variations between urban and rural areas.

TOTAL

TRADE AND AID (1)

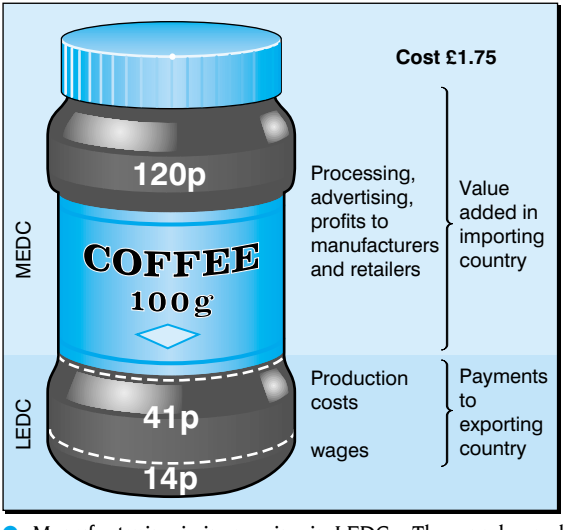
- **International trade** is the movement of goods and services between countries. The things a country sells abroad are its **exports**. The things it buys from abroad are **imports**. The difference between a country's imports and exports is its **balance of trade**.
- There has been a great expansion in world trade. The LEDCs have gained least from this growth. The value of trade in most countries in the poor 'South' is less than 1,000 US dollars per head - below 25% of the figure for countries in the rich 'North'.
- Countries try to protect their own economies by imposing **tariffs** and **quotas** on foreign imports. The **World Trade Organisation** aims to promote **free trade** by removing these restrictions. There are many influences on international trade.
- **Trading groups** such as the EU are set up to promote free trade between its members and to reduce the effectiveness of foreign competition. A lot of the trade between MEDCs and LEDCs is the result of **globalisation** and the spread of **TNCs**.



Influences on international trade

Trade and Aid (2)

- Most trade is between MEDCs. There is an increasing amount of trade between MEDCs and LEDCs, turning primary goods into manufactured goods. Most of the world's poorest countries rely on the export of **primary goods**. Converting primary goods to manufactured goods '**adds value**'. Most manufacturing takes place in MEDCs who gain most from the profits and jobs that this creates.
- Coffee growers in LEDCs receive less than 33% of the supermarket price for a coffee jar. There are great fluctuations in the price of primary goods. There has been a steady fall in the price of primary goods compared to manufactured goods.

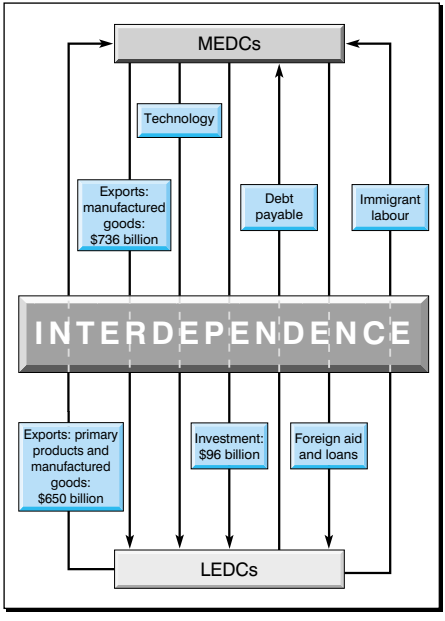


Value added to a jar of coffee

- Manufacturing is increasing in LEDCs. The goods are largely low-tech such as textiles, clothing and metals. High-tech exports such as chemicals, cars and electronic equipment are becoming more important. The profit from these exports however, may go to a TNC in an MEDC.

Aid

- **Aid** to LEDCs can be in the form of money, food, equipment and technical assistance. Few MEDCs achieve the UN recommended target of donating 7% of their GNP as foreign aid. The Scandinavians are the most generous donating between 0.83 and 0.92%. The UK gives 0.26% of GNP and the USA just 0.16%.
- **Short-term aid** is sent in response to an emergency, e.g. a natural disaster. The purpose of **long-term aid** is to improve the quality of people's lives. **Multilateral aid** is donated by international bodies such as the World Bank. It is unlikely to have any conditions attached. **Bilateral aid** is given by one country to another. It may be **tied aid**, e.g. the LEDC may have to purchase certain goods made in the donor country.
- **Non-governmental organisations (NGOs)** such as charities rely largely on private donations and government grants. They often support **appropriate technology schemes**.



Interdependence between MEDCs and LEDCs (1994 figures)

- Aid has advantages and disadvantages for both MEDCs and LEDCs. The advantages to LEDCs are that money and emergency supplies are available at times of disaster. Also, foreign investment helps economic and social development. However, there is a danger that LEDCs become too dependent on aid. This is particularly true for tied aid. An LEDC may not be able to get the best prices for its products. MEDCs gain prestige from donating foreign aid. **Corruption** in LEDCs means that a lot of aid does not reach the right people. Aid money may be used to buy military arms.

Interdependence

- LEDCs and MEDCs depend on each other. Trade, investment, loans, interest payments, foreign aid and international migration link them.
- MEDCs gain from this **interdependence**. They obtain raw materials and foodstuffs relatively cheaply. Profits from TNCs usually go back to MEDCs. Tied aid boosts exports and secures jobs in MEDCs. However, cheaper wages and fewer planning restrictions in LEDCs mean that investments by TNCs can cause job loses in MEDCs. Industrialisation in LEDCs may produce stiff competition to industries in MEDCs.

- LEDCs gain **hard currency** by exporting to MEDCs. LEDCs benefit from investment by TNCs. New jobs are created often educating people in new skills and technologies. The terms of trade often works against LEDCs. Exploitation of primary resources in LEDCs may cause environmental damage.

Trade and aid (1–4)

1 What is interdependence? (1)

2 State one way in which transport infrastructure can influence international trade. (1)

3 What does NAFTA stand for? (1)

4 What is a protective approach to trade? (1)

5 Why did Japanese car firms establish car factories within the EU? (1)

6 What percentage of the price of a jar of coffee is paid to the producing country? (1)

7 What is dependency culture? (1)

8 Name one raw material that forms the bulk of exports for an LEDC of your choice. (1)

9 The Canadian government gave money to Tanzania on the condition that the African country bought tractors from Canada. What kind of aid was this? (1)

10 State a disadvantage of the aid donated by Canada. (1)

11 Give two reasons why people may not wish to give to charitable aid agencies. (2)

12 Why is hard currency so important to LEDCs? (2)

13 Explain how an expansion in trade should lead to increased prosperity. (3)

14 What advantages does a LEDC gain from joining a trading group? (3)

SCORE

1 Recognition that LEDCs and MEDCs are so closely linked economically that they must work together for mutual benefit. (1) Look at the cartoon on side 100.

2 Ports for oil tankers or bulk carriers allow bulky raw materials to be shipped from LEDCs to MEDCs. (1) Better transport links within LEDCs help the export of agricultural produce.

3 North America Free Trade Association. (1) Another trading group is the EU.

4 Protection of home industries from foreign competition by the imposition of import tariffs and quotas. (1) This is the opposite of free trade.

5 Japanese cars built within the EU are not subject to the import restrictions on cars made in Japan. (1) Nissan, Honda and Toyota all established car factories in the UK.

6 Approximately 31%. (1)

7 Where a country relies on foreign aid to support its economy. (1) For example, some LEDCs in Africa.

8 Oil in Nigeria. (1)
Oil represents over 95% of Nigeria's exports.

9 Bilateral aid. (1) It is also tied aid.

10 Tractors may not be the most appropriate form of technology to use in Tanzanian agriculture. Spare parts may not be available. (1)

11 They argue that too much money is spent on administration. (1) They may not agree with the charity's culture, e.g. many charities have a religious aspect. (1)

12 It is less likely to change in value. (1) LEDCs can use it to buy goods in MEDCs. (1).

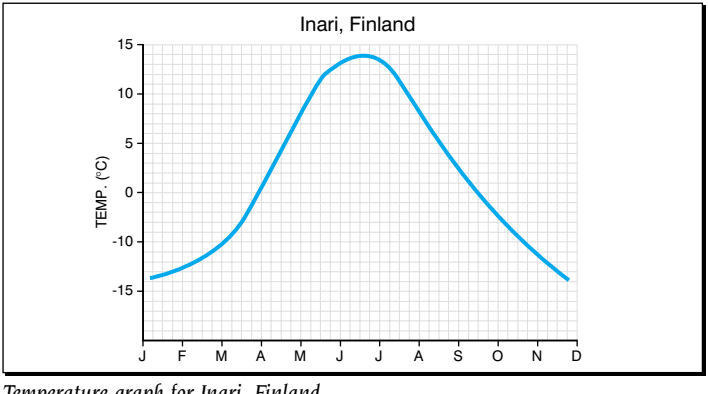
13 Countries will specialise in goods and services that they produce best. (1) There will be lower prices and higher quality goods and services available. (1) Increased demand will lead to an expansion of jobs. (1) These are linked in a cycle of prosperity.

14 They can influence the market. (1) As part of a trading bloc the LEDC is stronger when dealing with other countries. (1) It may benefit from subsidies or lower interest on loans. (1)

TOTAL

GEOGRAPHICAL SKILLS (1)

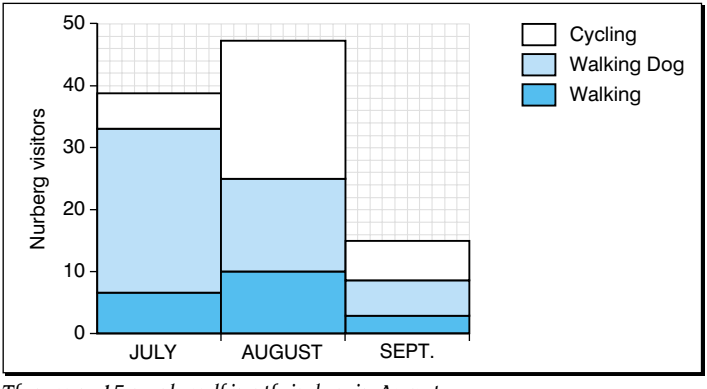
- GCSE geography examinations will test three main elements; recall of factual knowledge, understanding of concepts and processes, and geographical skills. The coursework component of the examination gives you the best opportunity to show your mastery of skills, but most questions in the written papers will have a skills-based section.
- Geographical skills include the drawing and interpretation of graphs, numbers, maps and diagrams. Marks will be given for the accuracy of your drawing, but there will be more marks for description and interpretation. Interpretation questions range from simple extraction of information from stimulus material to description and to analysis and evaluation.
- The four major types of graph tested at GCSE are line, bar (or histogram), scatter and pie. If asked to draw any of these it is important to do it accurately. The degree of toleration allowed is quite small. Use a sharp pencil and a ruler.
- Use line graphs to plot continuous data, e.g. temperature, population. Plot the points accurately and join them by a continuous line – either freehand or using a ruler.



Temperature graph for Inari, Finland

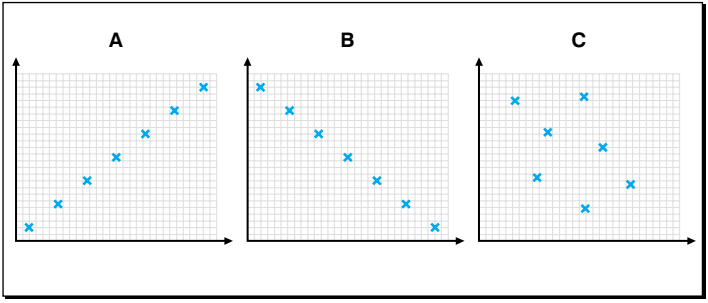
GEOGRAPHICAL SKILLS (2)

- Plot discontinuous data on a bar graph, e.g. rainfall. Again, plot the data as accurately as you can.
- Proportional or divided graphs are useful for displaying more than one set of information. When reading these graphs it is important to remember that the start of each sub-division is the base line from which to read figures.



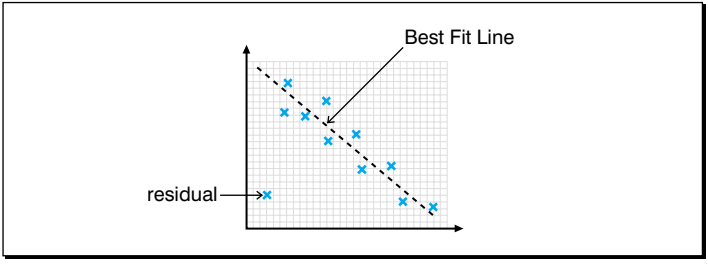
There were 15 people walking their dogs in August.

- Use scatter graphs to show the relationship between two sets of figures. On a scatter graph it is the pattern that the points make that it is important, so do not join up the points. If there is a clear pattern do not assume automatically that one feature caused the other. There are examples of scatter graphs on side 3 of Geographical Skills.
- There is a wide range of uses for scatter graphs in geography. Examples include relationships between latitude and temperature; GNP and infant mortality, and application of fertiliser and yield of crops.



Typical scatter graph patterns (or correlations).

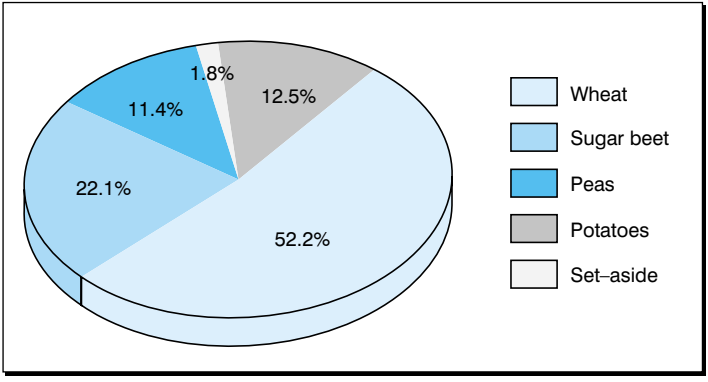
- In the graphs above there is a positive link in A because one variable increases with the other. In B the link is negative because one variable increases as the other decreases. If the points form a straight line then there is a perfect relationship. This is very unusual. The trend in the points can be shown by a best-fit line (see below). Residuals are obvious exceptions to the trend. In C (above) there is no relationship at all.



Line of best fit for a scatter graph pattern

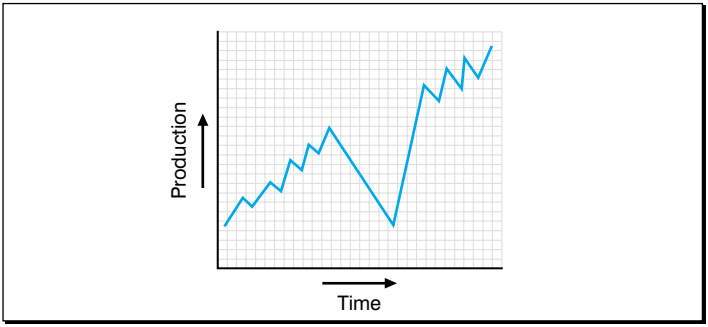
GEOGRAPHICAL SKILLS (4)

- Pie graphs show proportions. Figures which need to be presented in a pie chart must be converted to percentages first.



Pie chart to show land use in Grange Farm

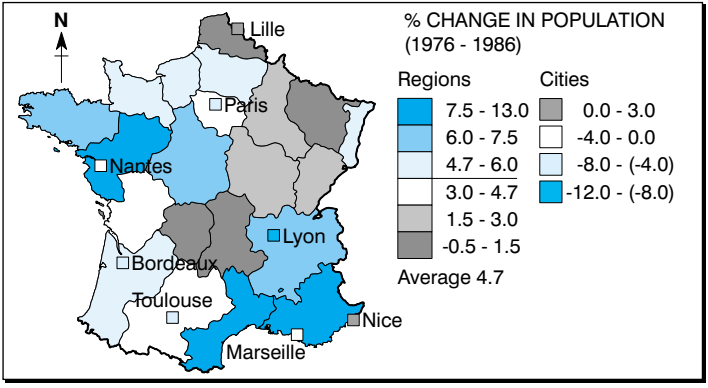
- Many GCSE questions start with a map, a diagram or a piece of text – so-called stimulus material. The question will ask for information contained in this material. Make sure that you extract information accurately. If a key is provided use the precise wording given including any units. For these questions no credit is given for any information that has not been taken from the stimulus material.
- A very common skills-based question is to ask for a description of a pattern made by some geographical feature. The question may be based on a map, a graph or a set of figures. The pattern should be considered from the general, the specific and the exceptional point of view. Give the overall trend or picture first, followed by specific details. State any exceptions to the general rule last and comment on them. The graph on side 5 shows how the production of a particular commodity has changed over time.



Production of a commodity over time

- Using the general/specific/exceptional rule:
  From the graph you can tell there has been a general rise in production over the years. The rise has not been steady. There has been a series of small-scale fluctuations which occur every few years. There was a major fall in output during one year.
- Atlas maps show patterns using chloropleth maps. The darker the colour the greater the value. Patterns in chloropleths can be described in the same way. Describe the general pattern that strikes you when you first look at a chloropleth map. Then list specific details that support this pattern together with any exceptions. Merely restating facts and figures does not show the examiner you can appreciate a pattern.
- Consider the following question:
  Describe the pattern of population change in France between 1976 and 1986.

  A possible answer is given on the reverse side of this card.



Population changes in France

- A possible answer to the question on the reverse side of this card could be:
  In general the areas of greatest population increase are in the north, west and south of the country. The south coast and the region around Nantes experienced population increases between 7.5 and 13.0%. The area of greatest loss was in the centre of France and in the North-east. The most central areas of France and two areas in the North-east, including the area around Lille, have seen a population decline of between 0.5 and 1.5 %. (This describes the general pattern with specific details illustrating the points made.) Exceptions to the general pattern are the areas around Paris and Toulouse, and the area north of Bordeaux where increases of only 3-4.7% are lower than expected. The population changes in the area to the extreme east of the country, with an increase between 4.7 and 6%, is higher than the surrounding areas.
- Notice that figures are quoted only to make a particular point. Previous knowledge of the geography of France is not necessary. Use only locations shown on the map. Compass directions should be used to refer to parts of the map.

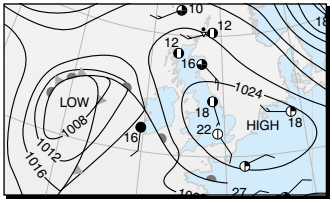
Geographical skills (1–6)

1 Study the weather chart.

i Is high or low pressure covering England and Wales? (1)

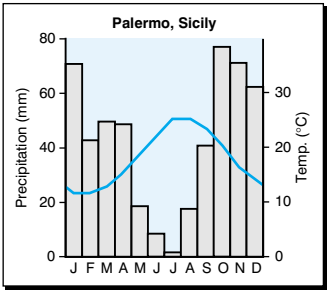
ii What kind of weather system is this? (1)

iii Using the weather map only, describe how the weather is likely to change if the weather system located west of Ireland moves east over England and Wales. (4)



1200 GMT 23 June 1994

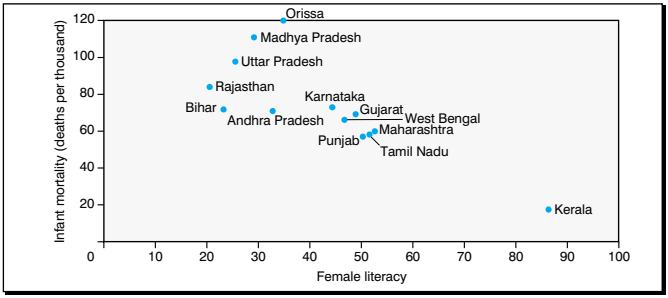
2 Describe the climate of Palermo using the climate graph. (8)



3 **i** What kind of graph is the one below? (1)

ii Why is it suitable for this information? (2)

iii Describe the pattern in the graph. (3)



SCORE

1 **i** High pressure. (1)

ii An anticyclone. (1) You need to be able to recognise both an anticyclone and a depression on a synoptic weather chart.

iii The temperature will drop from 18–22°C to about 16°C. (1) The wind will strengthen slightly. (1) It will change from a south-easterly to a south-westerly direction. (1) The sky will get cloudier. (1) It is very important that you use only the information shown on the weather map.

2 The hottest month is August with a temperature of 25°C. (1) The coolest month is January with a temperature of 12°C. (1) The temperature range is 13°C. (1) There is a marked winter maximum of precipitation. (1) The driest months are June and July. (1) March and April are wetter than the rest of spring. (1) October and November are abnormally wet autumn months. (1) October is the wettest month, averaging 78 mm. (1) Make sure you refer to both patterns in temperature and precipitation.

3 **i** Scatter graph. (1)

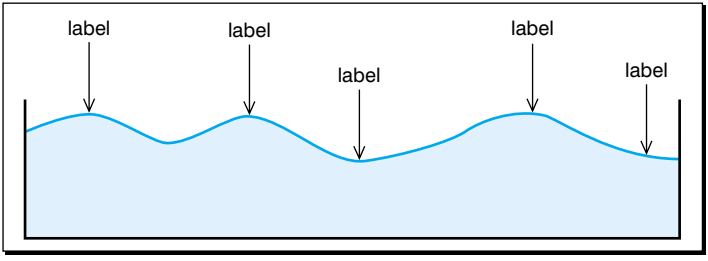
ii It plots the relationship (1) between two sets of data. (1)

iii There is a negative relationship between infant mortality and female literacy. (1) The relationship is quite strong as most points lie close to the line of best fit. (1) Orissa is the most obvious exception. (1) In an examination the figures will be carefully chosen so it is obvious whether or not there is a relationship!

TOTAL

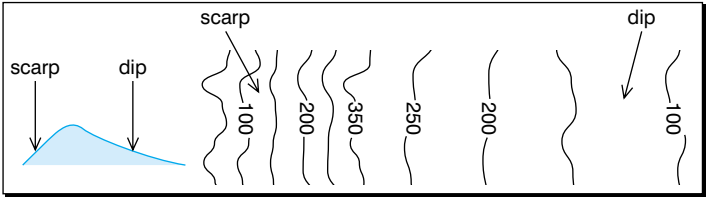
Reading OS Maps (1)

- Most GCSE geography examinations include work on Ordnance Survey maps. This may be an entire question or a piece of stimulus within a question testing a particular part of the syllabus. The scales used are mostly 1:25,000 or 1:50,000. The questions test basic map reading skills, as well as description and interpretation of maps.
- The basic map reading skills concern four and six-figure grid references, measurement of distance, compass directions and map symbols. The map usually has a key so there is no need to learn the symbols off by heart.
- Questions will often ask you to draw annotated sketch maps or cross-sections. Cross-sections are useful for showing relief or a particular physical feature. Remember that a sketch map is a view from above, whereas a cross-section is a view from the side. Label cross-sections using arrows over the surface:



- Use technical terms such as convex/concave, dip/scarp, etc. when describing slopes. Use the correct technical terms for landforms too, e.g. valley, plateau, steep-sided hill. The closer together the contours the steeper the slope. Try to recognise distinctive landforms by the pattern of their contours. For examples of this, see the reverse side of this card.

READING OS MAPS (2)



Recognising landforms using map contours

- Remember that you will be asked to **describe** a landscape. If the question is specific to map reading you will not be asked to **explain** how the landform came about; unless the map is part of a physical geography question.
- It is useful to memorise a series of checklists for answering map reading questions. This will help you to organise your answers and show the examiner that you can answer methodically.

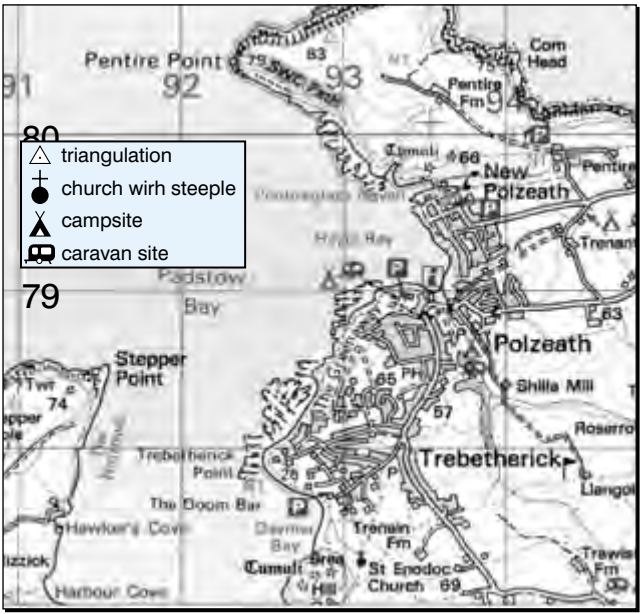
Description of relief
What is the highest point? What is the average height? What kind are slopes are present?

Description of drainage
(This is the pattern of rivers and surface streams.)
What are the main rivers? In which direction do they flow? Are there any major watersheds?

Description of coast
In which direction does the coast run? Is it smooth or irregular? Are there signs of erosion or deposition? Are there any beaches or sand dunes? Is there any evidence of coastal management?

Description of settlement
What is the general shape of the built-up area? Have any physical features influenced this shape? Have communications influenced the settlement's growth? Was the original site a wet-point or a dry-point? Can you recognise the CBD, the inner city and the suburban areas by the road pattern?

Reading OS maps (1–2)



1 Study the OS map extract. Imagine you were walking along the South West Coast path from 935797 north westwards to Pentire Point. Describe the countryside around you. (5)

2 Suggest three reasons why Daymer Bay in square 9277 might be a suitable place to take children. (3)

3 Describe the pattern of settlement inland from the coast. (2)

4 Suggest why a settlement grew up at the site of Polzeath. (4)

5 Describe and explain the layout of the combined settlements of Trebetherick, Polzeath and New Polzeath. (6)

SCORE

1 You would see a river inlet at the start. (1) Moving further north-west there are flat rocks to the west. (1) The path has a relatively steep slope (1) rising from 66 to 83 metres in just over a kilometre. (1) The headland at Pentire Point levels off. (1) The question allows you to describe both physical and human features.

2 It does not face open sea (1) so it may be more sheltered than other parts of the coast. (1) There is a large area of sand at low tide. (1) This question is more difficult because you are asked to interpret the map not just describe it.

3 The area is sparsely settled. (1) Settlement consists of a series of randomly spaced isolated farms and hamlets. (1) Remember, state general terms first, then specific points.

4 There is a source of fresh water from the stream (1) so it is a wet-point settlement. (1) It is at the head of Hayle Bay and therefore well sheltered. (1) The land around the bay is not too steep for building houses. The rest of the coast has steep cliffs. (1) You need to give a reason for each of the points you make.

5 The oldest part of the settlement appears to be Polzeath (1) which developed where the stream enters Hayle Bay (1). The settlement appears to have grown north (1) to New Polzeath and south (1) to Trebetherick. There has been ribbon development (1) along the roads especially in Trebetherick. New developments (1) appear to be present west of the road towards The Greenaway. Evidence for this is the more modern, geometric pattern of the roads. Remember to include both description and explanation in your answer. Use technical terms whenever possible.

TOTAL

Examination Techniques (1)

- However well you have learnt your work, you must write it down in a suitable way in an examination to gain credit. This means answering each question in the way that the examiner asks. The key to this is understanding the **command words**, making the right choice of optional questions and appreciating how your answer will be marked.
- Make sure that you are fully aware of the parts of the syllabus being tested in each question paper and the form the questions will take. Some questions may require one word or short paragraph answers, others may be multiple choice. Essays are not very common in GCSE Geography examinations but there will be opportunities to write in continuous prose. These are more common in Higher Tier papers targeted at Grades A*–D(E).
- If there is a choice of questions in a paper, make sure that you answer the correct number of questions from the right sections. Do not be unduly influenced by the stimulus material at the start of the question when choosing. Read the whole question. Most marks are allocated to the last part of a question. Decide whether you are happy with this section before choosing.
- Read the question very carefully. Underline the key words and phrases. Make sure that you understand how many examples or case studies you need to use. Be wary of scale. If a question asks for a named location, a country or a continent is too large an area. If you are asked to name a tourist development in a LEDC, Blackpool or Spain is wrong.
- Make the most of the sketch maps and diagrams provided. You will drop marks if you do not use maps and diagrams in a question when it specifically asks you to. Many questions, particularly those testing physical geography, can be answered with annotated diagrams. A simple diagram can save writing a long description.

- Make sure that your examples are filled with facts, statistics and precise locations. When describing climate use appropriate figures. Do not use vague generalisations. You will not gain credit for using words like 'wet', 'dry' or 'fertile'. 'Deep, well-drained' or 'rich in nutrients' are creditworthy alternatives to 'fertile'.
- Make sure that you understand the meaning of command words:

  Describe: What does a feature or place look like? You will get no credit for explanation or interpretation.
  e.g. *A corrie is an armchair shaped circular depression on the side of a mountain. It has steep back walls on three sides with a rock lip at the front.*

  Explain: Give reasons for the formation or location of geographical features.
  e.g. *The rotational movement of glacier ice forms a corrie. Overdeepening occurs as a result of plucking and abrasion.*

  State or **List**: Make a number of brief points. This is the only occasion where there is no need to write in complete sentences. Remember that there are 5% extra marks for correct spelling, punctuation and grammar (SPaG) in all geography examinations. This includes credit for the use of technical terms.

  Compare: Point out the similarities and differences.

  Contrast: Say what the differences are.

  Annotate: Add notes to a diagram. These need to be more than simple labels.

  To what extent: You need to come to a conclusion by giving different points of view.
- GCSE examinations are always positively marked. Marks are not deducted for giving a wrong answer. Try not to leave gaps. Attempt all the questions except those optional ones you have chosen not to answer. Even if you have to guess an answer you stand a better chance of getting marks. Do not think that by answering **all** the optional questions you will get a higher mark!

Examination Techniques (3)

- Try to complete the full number of questions required. Do not spend too much time on the first question, or those that you know best. If you do not finish the paper you will automatically lose marks. Pace yourself, spending time in proportion to the number of marks available. It is pointless writing a side of text on a question part worth just 2 or 3 marks.
- If you do run short of time, answer the last question in coherent note form. The examiner will try to give you credit for any relevant points. If you have written a plan for an answer, do not cross it out until you completed the question. If you run out of time the examiner may be able to award marks for the ideas in your plan.
- Write concisely and to the point. Do not waste time writing out the question before starting the answer. The number of marks will give you some indication of how long your answer should be. In many GCSE examinations you write answers on the question paper. The space for each answer is a useful guide too.
- Use maps and diagrams effectively as they can save you time. Do not repeat yourself by writing the answer in words and as a diagram. The text will be marked first and if there are still marks available, any additional points in the diagram will be considered.
- Remember it is not necessary to write a perfect answer to gain full marks. As soon as you have scored the maximum number of creditworthy points in a question the examiner will stop marking. The question may indicate how many points you have to make. If you are asked to state two disadvantages of the Green Revolution, you will gain no extra marks for a third.
- Never give a series of alternative answers, leaving the examiner to choose the correct one. The first answer is the one that will be marked.
- In some questions the examiner will give you a list of answers to choose from. Remember there may be some distractors, or wrong answers among them.

EXAMINATION TECHNIQUES (4)

- GCSE questions are marked in two ways. Sections of questions with 3 or fewer marks are likely to be **point marked**. There will be one mark for each correct, relevant point. In most cases the wording of a question will indicate whether a question is point marked. If there are three marks for a question asking for three features of an Equatorial ecosystem, the allocation of those marks is obvious.
- **Level-marked** questions will usually have four or more marks allocated to them. On Foundation Tier papers targeted at Grades C–G there are usually two levels. On Higher Tier papers three levels are more common. The question will be marked as a whole, and it is not necessary for your answer to go through all the levels. If the first sentence is of Level 3 standard then the minimum score will be at the bottom of the Level 3 range of marks. A typical mark scheme may be divided as follows: Level 1, 1–3 marks; Level 2, 4–6 marks and Level 3, 7–8 marks. There is a maximum number of marks for statements of a particular standard. For this mark scheme, only three Level 2 statements will be credited. If the whole answer consists of Level 1 statements, then the maximum score will be three. Two Level 3 statements will get full marks.
- Aim to answer the question at the highest possible level. Basic statements will not get beyond Level 1. Level 2 answers should contain clear statements with reference perhaps to a named example. Level 3 answers contain even more detailed information, often using case study material.
- Now look at the following questions and find out how they would be marked.

Explain why long-term aid is better than short-term aid. (8 marks)
A typical mark scheme would look like this:

Level 1 Basic (1–2 marks)
Simple statements, e.g. Short-term aid gives food to the starving.
There is no long-term effect.

Level 2 Clear (3–5 marks)
Long-term aid helps people to help themselves, so they are better prepared for the next food shortage, e.g. Band Aid.

Level 3 Detailed (6–8 marks)
Details are given of a particular aid scheme referring to the advantages of the long-term increase in food production, e.g. the former USSR part-funded the Aswan Dam. Previously, food production relied on flood water for irrigation, so farming was possible for only short periods. The dam allowed long-term irrigation and more than one crop of rice could be harvested each year. Farming became a year-round activity increasing financial stability.

Explain why the use of appropriate technology may become very important in reducing starvation in the world. (6 marks)

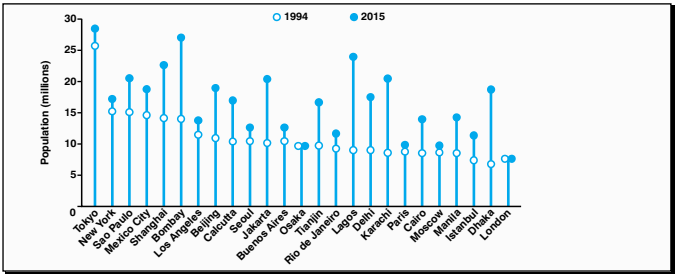
Level 1 Basic (1–2 marks)
Simple statements showing how the food supply will increase without saying how the appropriate technology will make it possible, e.g. The new hoe means that crops can be grown more easily.

Level 2 Clear (3–4 marks)
The detail is accurate and shows understanding, e.g. One person still needs to operate the improved hoe, but the larger blade is more effective. It allows the person to hoe a larger area in a shorter time.

Level 3 Detailed (5–6 marks)
Detailed understanding, possibly supported by case studies or exemplars. For example, wind pumps in Kenya allow a fresh supply of water to be brought to remote areas where it would be too expensive to build a larger system. This could serve up to 400 people a day. Local people can be trained to make and repair the pumps easily. The constant water supply will allow farming throughout the year and a greater range of crops to be grown.

Check yourself

1 Study the following diagram, which shows the growth of the world's largest cities between 1994 and 2015.

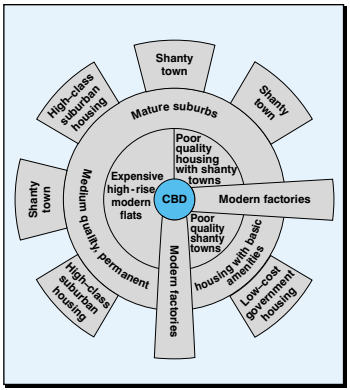


i Which was the largest city in 1994? (1)

ii How many of the cities are in MEDCs? (1)

iii In which ways is the population growth in LEDCs different from those in MEDCs? (2)

2 Study the diagram of the urban zones in a typical city in a LEDC.



i State four characteristics of the Central Business District of this city. (4)

ii Why are different types of housing found in different parts of the city? (4)

iii Describe two ways in which the urban model for a city in a MEDC would differ from the one shown here. (2)

3 Describe the ways in which the problems faced by people living in shanty towns in LEDCs have been tackled (6)

1 **i** Tokyo. (1) The first question is usually very straightforward.

ii Seven. (1) Tokyo, New York, Los Angeles, Osaka, Paris, Moscow and London.

iii The population of cities in LEDCs has grown. (1) The population of cities in MEDCs has remained much the same. (1) Do not be afraid to state the obvious.

2 **i** There will be a concentration of commercial activities such as shops and offices (1). The cost of land will be very expensive.(1) There will be a concentration of multi-storey buildings. (1) People move around mainly on foot. (1) Four separate points are needed.

ii The expensive, modern high-rise flats are near to the city centre. The people who live in them will work in the CBD. The poor quality housing with basic amenities may be larger buildings, which are in multi-occupancy, often single males waiting for their families to join them from the countryside. The low cost government housing on the outer edge are former shanty towns which have been improved with the aid of government grants and foreign aid. The shanty towns on the edge of the city are low quality, unplanned houses occupied by recent migrants. (4) Four separate points needed. You are being asked to interpret the diagram. You may make use of case studies to answer this question.

iii The poorest quality housing will be near the city centre. There will be a steady improvement in the quality of the housing as you move outwards from the city centre. (2) Two separate points are needed. Other possible answers are: lack of shanty towns and larger areas of suburban housing.

TOTAL

3 Level 1 Basic (1–2 marks)
Simple statements such as new water supplies, sewerage systems, better built houses.

Level 2 Clear (3–4 marks)
There will be reference to a case study by name only, but without any detail, e.g. Nairobi. Only one solution may be considered. There will be some development of the points made. For example, improving the job prospects of the people living in shanty towns, so that there will be more money available. The answer will not say how more jobs are made available or what the benefits are of there being more money around.

Level 3 Detailed (5–6 marks)
More than one example used to show the different methods, such as those undertaken by the inhabitants themselves and those used by the government. For example:
Site and service schemes (Lusaka, Zambia). Authorities provide basic room and veranda with basic public utilities and infrastructure. Inhabitants are responsible for providing for the rest of their particular family's needs.
Kampungs (Djakarta, Indonesia).
Government takes over whole districts and improves the environment, i.e. houses, roads, water and sewerage system.
Notice that the question asks for more than one solution. This is why you need to read questions very carefully.

TOTAL

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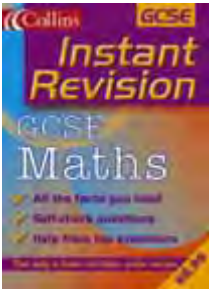

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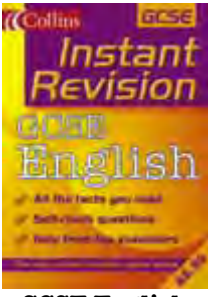

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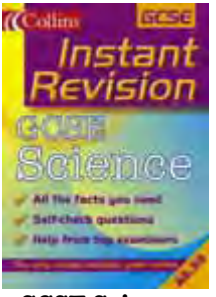

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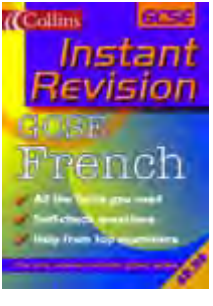

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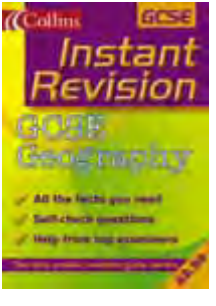

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